RECONFIGURATION, REPLACEMENT OR REMOVAL?

EVALUATING THE FLEMISH POST-WAR DETACHED DWELLING AND ITS PART IN CONTEMPORARY SPATIAL PLANNING AND ARCHITECTURE

VOLUME I: TEXT

Marijn van de Weijer

Supervisors:
Prof. dr. ir. Hilde Heynen
Prof. dr. Koenraad Van Cleempoel
Prof. dr. ir. Michael Ryckewaert

Members of the Examination Committee:
Prof. dr. ir. Dirk Vandermeulen, chairman
Prof. dr. ir. Oswald Devisch
Prof. dr. Dominique Vanneste
Prof. ir. Guido Geenen
Dr. Anique Hommels (Associate professor)
Prof. dr. ir. Griet Verbeeck

Doctoral dissertation
presented in partial fulfilment
of the requirements for the
degrees of
Doctor in Engineering at
KU LEUVEN
Doctor in Architecture at
HASSELT UNIVERSITY

2014

Uitgegeven in eigen beheer, Marijn van de Weijer, Leuven

ISBN 978-94-6018-823-7
D/2014/7515/47

Dit proefschrift is opgedragen ter herinnering aan mijn grootouders Marinus en Cato, Piet en Anna. Vier nuchtere mensen die niet bang waren te verhuizen op de momenten dat hun leven daar om vroeg. Ook het delen van de woning met familie was voor hen een alledaagse realiteit.

Reconfiguration, Replacement or Removal?

Table of Contents

Abstract

This research explores whether the intrinsic spatial surplus of the post- war, detached dwellings and low-density, dispersed residential neighbourhoods in Flanders, holds potential for transformation in line with contemporary housing standards and demands. This work adopted an architectural approach in order to investigate the feasibility of transformative strategies. Hence, it forms one of three complementary tracks of the FWO funded project Large, Underused Dwellings in Flanders, and is based on typological and design-based research, whereas the other two tracks have respectively studied the shared problem from a geographical and a discursive perspective. This doctoral project has also taken on a second goal which is to frame such design-based enquiry in an academic context. As main source for data gathering throughout the entire project, 10 municipalities across Flanders, with a significant share of detached dwellings, were selected as case studies.

About 80% of the Flemish housing stock consists of single family houses, of which 42% are detached dwellings. Many of these were built on spacious lots in a semi-rural or suburban environment during the massive suburbanisation process which was started after the Second World War. The detached dwelling in a semi-rural, green environment has been a key building stone in this process, and is still perceived as the ideal housing situation by many Flemings. The structure of small-scale ownership ensures continuity, and the system facilitates incremental infill of empty lots and retrofitting existing dwellings. This housing model and its mode of production can however be seen as problematical, because they no longer match demographical and socio-economic developments. The ageing population, and the decreasing average household size, result in a demand for other residential typologies: smaller, more compact, and preferably closer to urbanised cores. Moreover, academic researchers, spatial planners and designers associate the continuation of this mode of spatial production with high emission levels, traffic congestion and loss of open space. Hence there is an emerging interest in, and a need for, alternative models and strategies of transformation.

The main body of the work is preceded by an exploration of designerly research, which emerged as a methodology proper to architectural research. Chapter two

describes how different approaches to designerly research are used in practice and academia, sharing the goal to address inert and ill-defined problems. A theoretical framework for exchange between scientific and design-based methodologies, allowing the development of transdisciplinary modes of enquiry into ill-defined problems is proposed. Consequentially, the thesis develops such a process of exchange. Complementary research approaches build on tentative observations and results, and contribute to the understanding of design strategies intervening in the residential environment on different scale levels. The viewpoints of inhabitants of detached dwellings regarding potential adaptive strategies are presented in chapter three. In chapter four, the viewpoints of inhabitants are complemented with a typological analysis of a sample of 65 dwellings documented during field work, in order to determine potential and resistance vis-à-vis transformative concepts on the scale of the dwelling. Chapter five enquires how professional actors involve the detached dwelling and potential design strategies for transformation in their work. A site- and case specific design approach is explored in chapter six, based on a workshop with students in interior architecture and architecture. The workshop investigated plausible conditions and narratives to implement transformative design concepts on the level of the dwelling. The thesis concludes by reviewing these diverse perspectives, addressing the paradoxes and alliances which are exposed, and outlines how these prototypical strategies could impact concrete municipalities. This analysis informs the formulation of three visions on transformation of low density residential environments, combining the strategies of reconfiguration (the retrofitting of existing dwellings) replacement (demolishing existing dwellings and replacing these with alternative dwelling types on site) and removal (the demolition of dwellings in remote locations followed by densification in more central areas). These visions outline potential evolutions towards differentiation and densification of Flemish residential neighbourhoods.

Samenvatting in het Nederlands

Dit onderzoek exploreert de typische overmaat van de naoorlogse, vrijstaande woning in Vlaanderen, en de uitgespreide woonwijken van lage dichtheid die gevormd worden door deze huizen. Er wordt onderzocht of deze overmaat ruimte biedt voor verdichting en aanpassing aan hedendaagse woonvragen en normen. Ten einde de haalbaarheid van transformatiestrategieën te bepalen, is in een ontwerpmatige benadering gekozen. Deze dissertatie is derhalve gebaseerd op typologisch en architectonisch onderzoek, en is daarmee het resultaat van één van drie complementaire onderzoekstrajecten die samen het onderzoeksproject Grote, Onderbezette Woningen in Vlaanderen hebben gevormd, naast twee trajecten op basis van geografische en discursieve analyse. Dit werk heeft daarbij een tweede doelstelling aangenomen, namelijk het inkaderen van dergelijk ontwerpend onderzoek in een academische context.

De hoofdbron voor het verzamelen van gegevens, in alle drie de onderzoekstrajecten, zijn tien casussen: gemeentes verspreid over heel Vlaanderen, ieder met een significant aandeel vrijstaande woningen in de plaatselijke woningvoorraad. Ongeveer 80% van de Vlaamse woningvoorraad bestaat uit eengezinswoningen, en 42% hiervan zijn vrijstaande woningen. Veel van deze woningen werden op ruime kavels gebouwd, in een quasi- landelijke of suburbane omgeving, ten tijde van het massale suburbanisatieproces dat Vlaanderen gekend heeft na de Tweede Wereldoorlog. De vrijstaande woning in een groene omgeving was en is een van de belangrijkste bouwstenen in dit ruimtelijke productieproces, en het bijbehorende beeld kleurt nog steeds de woondroom van menig Vlaming. Het versnipperde eigendom wat hier aan de basis van ligt, verzekert de continuïteit van deze ruimtelijke ordening, waarbij veranderingen vaak blijven bij verbouwing of vernieuwbouw van individuele woningen, of het opvullen van lege kavels in residentiële wijken. Dit woonmodel en de modus van ruimtelijke (re)productie kunnen echter als problematisch bestempeld worden in het licht van demografische en sociaaleconomische ontwikkelingen. De vergrijzende bevolking en het steeds kleiner gemiddelde huishouden liggen achter de rijzende vraag naar alternatieve woonvormen: kleiner, compacter, en bij voorkeur dichter bij algemene voorzieningen. Voorts associëren onderzoekers, planologen en ontwerpers de voortzetting van

deze ruimteverslindende woonvorm met hoge emissieniveaus, fileproblemen en het verlies van open ruimte. Daarom is er een toenemende interesse voor, en nood aan, alternatieve ruimtelijke modellen en transformatiestrategieën.

De hoofdmoot van dit onderzoek wordt voorafgegaan door een exploratie van het begrip ontwerpend onderzoek. Dit concept wordt in de academische wereld breed bediscussieerd omdat het aan verschillende architectuurscholen wordt gezien als een mogelijkheid een architectuur-eigen onderzoeksmethode te ontwikkelen. Hoofdstuk twee schetst verschillende benaderingen om dit concept toe te passen in de ontwerppraktijk en in academisch onderzoek, met het gedeelde doel om weerbarstige en moeilijk te definiëren problemen aan te pakken. Dit hoofdstuk stelt een theoretisch kader voor dat de mogelijkheden van uitwisseling tussen wetenschappelijke en ontwerpmatige methodieken verklaart, en dat daardoor de ontwikkeling van transdisciplinaire methodes voor het onderzoeken van weerbarstige problemen mogelijk maakt. Met dit als basis, ontwikkelt deze dissertatie een onderzoeksbenadering waarbij verschillende kijkpunten elkaar aanvullen. Elke voorlopige conclusie leidt naar een wisseling van instrumenten en van bril om het probleem verder uit te graven en anders te bekijken. Het ontwerpmatig denken staat centraal, en een voortschrijdend inzicht in mogelijke strategieën van aanpassing op verschillende schaalniveaus wordt ontwikkeld. In hoofdstuk drie worden om te beginnen de standpunten van huidige bewoners van vrijstaande woningen in de casusgemeentes met betrekking tot wijktransformaties toegelicht. In hoofdstuk vier worden deze standpunten aangevuld met een analyse van de woningen van deze inwoners, die als steekproef voor de Vlaamse voorraad vrijstaande woningen dienst doen. Waar hoofdstuk drie inging op de menig van bewoners, bestaat deze benadering in een architectonische analyse van bouwkundige mogelijkheden. In aanvulling daarop, wordt gekeken naar het niveau waar in de praktijk bouwkundige mogelijkheden en sociale tendensen samenkomen: hoofdstuk vijf bespreekt zodoende de kijkpunten van professionele spelers, zoals architecten, stedenbouwkundigen en vastgoedspecialisten, die dagelijks met deze problematiek werken. Ten laatste wordt in hoofdstuk zes, in aanvulling op het abstracte niveau van studie, een aantal specifieke situaties bekeken op woningniveau. Dit wordt gedaan op basis van de resultaten van een ontwerpoefening waaraan studenten Interieurarchitectuur en Architectuur hebben meegedaan. De deelnemers hebben ontwerpen voorgesteld,

op basis waarvan verhaallijnen en condities voor succesvolle herbestemming van woningen afgeleid zijn. In de synthese worden deze verschillende perspectieven op een rij gezet, waarbij contrasterende en overeenstemmende resultaten blootgelegd worden. Er wordt uitgelegd hoe prototypische ontwerpstrategieën concreet kunnen worden toegepast in specifieke omstandigheden. Deze analyse leidt to de formulering van drie specifieke visies, die elk draaien om een eigen combinatie van het aanpassen van bestaande woningen, het vervangen van bestaande woningen door andersoortige woningtypes op dezelfde plek, en het verwijderen van verouderde woningen van ongunstige locaties, gecombineerd met vervangende nieuwbouw op een andere plek. Deze visies stellen mogelijke ontwikkelingen voor die leiden naar meer verscheidenheid en een hogere dichtheid in Vlaamse residentiële buurten.

Acknowledgements

At the end of 2009, professor Hilde Heynen approached me as a possible candidate for contributing to a research project which would look at alternative ways of inhabiting existing dwellings in Flanders. This invitation came in a difficult time for architects in general. The development of the international financial crisis had a serious impact on the building industry, and I felt privileged to have the opportunity to develop my professional interest in architecture in an academic environment. The proposed project appealed strongly to my search for content and relevance in the field of architecture.

In many respects, the research proved to be a challenging task on which I worked with a lot of pleasure. The interdisciplinary nature of the project required getting acquainted with ideas and methods of other disciplinary fields. One theme which had drawn my attention was the inscription of design in a research project. This designerly research proved to be elusive and ambiguous. Moreover, although I had studied before at the KU Leuven (I want to thank Bruno De Meulder for his advice to do so), the international scope of the Master of Human Settlements did not include a focus on the specific Belgian condition, and this required some additional study of the local culture, legal issues, and linguistic peculiarities. Regularly, the thought crossed my mind that I, as a cultural outsider, might not posess the perfect profile needed to get the job done: still, I managed, thanks to the help of many.

Therefore, I thank the KU Leuven, the Faculty of Engineering Science, the department of Architecture and the research group OSA in Leuven, as well as Hasselt University, the Faculty of Architecture and arts, and research group ArcK in Hasselt, for supporting me in my research on this challenging topic. I am also grateful to the FWO for providing the financial means to complete this project. I want to warmly thank the project initiators for granting me their trust in facing this challenge and including me in the project team. I had the luxury of having three supervisors, and their combined knowledge was a welcome source for advancement in this endeavour. Hilde Heynen has been the driving force behind the project. She taught me anew how to relate the built environment to societal concerns, and has continuously supported me in structuring my thoughts and my writing. My conversations with Koenraad Van Cleempoel usually were not limited to the everyday issues of the project, but his

broad interest in art, design and education flavoured every talk. He has provided me with important opportunities to test my concepts in the design studio. Michael Ryckewaert added his profound knowledge of housing and planning in Flanders to this spectrum. In their diversity, my three supervisors shared confidence and enthusiasm for the work I started to develop, for which I am grateful.

Another discipline included in the project has been geography, and Dominique Vanneste has provided valued advice as an assessor throughout the process. Advice also came from Oswald Devisch, with whom I could explore the ins and outs of scenario-thinking. The first three years, also Han Vandevyvere contributed with his critical interpretation of the project ambitions. It was a pleasure to supervise Master students in Leuven together with Guido Geenen, and I am glad he also took place in the jury. The same goes for Griet Verbeeck, with whom I could already discuss some of my ideas in Hasselt. The jury was completed with Anique Hommels, and chairman Dirk Vandermeulen. Thanks to the critical and constructive remarks of the jury members, I found the inspiration and energy to improve my work further.

I was 'in the field' with Wouter Bervoets and Lieve Vanderstraeten. Lieve was our helpline when we had questions about geographical matters. Wouter not only was working on a PhD project complementary to mine, he also helped me to integrate in the Belgian society and taught me essential expressions for that purpose, like 'tjeef' and 'à l'aise'. We shared many nice conversations about architecture, music or politics while on the road to conduct interviews. I'm grateful that our cooperation went smoothly and that we could solve work-related problems together. A number of colleagues in Hasselt could not have been missed while organising the design exercises addressing detached dwellings we undertook with Master students. Philippe Swartenbroux, Victor Simoni, Huub Berger, Jo Klaps, Saidja Heynickx, Griet Verbeeck and Roel de Ridder contributed with their insight and knowledge. Ruth Stevens did also, and in addition to that, helped with the organisation. The students developed some sort of enthusiasm out of their initial doubt, and I thank them for their participation. Also I need to express my thanks to the students in Leuven who took up a master thesis related to our research topic. Also I am grateful to Rob Cuyvers and Koenraad Van Cleempoel for giving me a new opportunity to further develop my research skills in Hasselt.

One of the characteristics of the Flemish housing system is that people do not move often during their lifetime; maybe it is a little ironic that I moved from one office to another several times. Every time I ended up with fine, new colleagues. In Leuven, I started out in de Oude Molen with Kishwar, Ceren and Janina. Then I was relocated to the printer room where Wouter and Veerle joined. After that, I moved to the "doctorate production plant" in the attic of de Oude Molen (capacity: 20 PhD producers) which was dismantled due to under occupation, since only Alex and occasionally Maddalena wanted to join us there; so I ended up in the castle where I met Fatima, Nurhan, Peter, and Lien. Simultaneously I occupied a work space in Hasselt, which I shared with Bie, Ann, Katelijn, Jan, Kris, Remco, Ruth and Karen, and here I only moved once from the cold basement to the sunny first floor where I sat with Oswald, Barbara and Sarah. Thank you all for your comradeship!

Not in the last place, I am grateful to all the inhabitants who invited us in to their house, and all the interested professionals who made time in their schedules for an interview.

Much support came from my family. My parents, brother and sister backed me from afar and I enjoyed the weekends we spent with them, during which I could recharge my batteries. Also I got energy and inspiration from meeting with my friends – together with 'architectural friends' Geoffrey, Rob, Jos, Jaap, and Eugène, I took pleasure in visiting buildings other than Flemish detached dwellings. Three guys really helped me in refreshing my energy on a regular basis: I especially enjoyed rehearsing and performing with my band, the Mariños, for which the distance became an obstacle after my son was born. Dudes, thanks for great times, I hope they can be continued soon!

I finish with the two persons who are the last thing on my mind before going to sleep and the first thing when I wake up. Mariana, these past four years were hectic but also beautiful, and I will always remember them as the years we started to build or life together. Without your belief and support, this work would never have been completed. You are my compass! Agustín, your passionate character and your smile always helped me to put my troubles in perspective. Please, never stop being so curious and so naughty. If we remain living in Belgium, I will use all my parental authority to keep you from building a detached house when you grow up.

List of acronyms

AIA	American Institute of Architects
ANT	Actor Network Theory
ASRO	departement Architectuur, Stedenbouw en Ruimtelijke Ordening/ *department of architecture, Urbanism and Spatial Planning*
AUP	Algemeen Uitbreidingsplan/ *General Expansion Plan* (Amsterdam)
BPA	Bijzonder Plan van Aanleg/ *Special Plan of Development*
CAD	Computer Aided Design
DIY	Do It Yourself
DUWOBO	Duurzaam Wonen en Bouwen/ *Sustainable Housing and Building*
EAAE	European Association for Architectural Education
E-level	Indicates the energetic performance of a building and its fixed installations under normal circumstances and depends of thermal insulation, air tightness, compactness, orientation and insolation. It is also influenced by the building installations. The Flemish Government sets norms for the maximum E-levels for new building permits.
FWO	Fonds wetenschappelijk Onderzoek/ *Research Foundation Flanders*
GRS	Gemeentelijk Ruimtelijk structuurplan/ *Municipal Spatial Structure Plan*
IOK	Intercommunale Ontwikkelingsmaatschappij voor de Kempen/ *Intermunicipal Development Agency for the Campine Region*
ISI	Institute for Scientific Information
K-level	Indicates the total insulation value of a building. The K-level is calculated for a building in its entirety. The Flemish Government sets norms for the maximum K-levels for new building permits.
MVRDV	Maas, Van Rijs, de Vries
NIMBY	Not In My Backyard
PAR	Participatory Action Research
PHL	Provinciale Hogeschool Limburg/ *Provincial University College Limburg*
RIBA	Royal Institute of British Architects
RSV	Ruimtelijk Structuurplan Vlaanderen/ *Spatial Structure Plan Flanders*
RUP	Ruimtelijk Uitvoeringsplan/ *Spatial Implementation Plan*
SCOT	Social Construction of Technology
SEE	Sociaaleconomische Enquête/ *Socio-Economic Survey*
STS studies	Science, Technology and Society studies
WWII	World War Two

1
Introduction

> *"We are well aware that the detached dwelling in a way has been stigmatised. That, to be blunt, it isn't politically correct anymore to build a detached dwelling ..."*
> (excerpt from an interview with architect Henk De Smet, May 2013)

This dissertation contributes to the search for more sustainability in the Flemish residential environment. The detached dwelling on a privately owned lot has a central position in this study, which enquires into architectural and urban design strategies for intervening in spatial situations defined by this typology. The detached dwelling is one of the smallest, and most regularly occurring, common denominators in the dispersed, Flemish built environment, and embodies a contemporary conflict between the traditional mode of housing production and its resulting built landscape on the one hand, and changing societal demands and expectations of the housing market on the other hand. This conflict exists in a mismatch between housing supply and demand on a regional scale. The significant share of Flemish detached houses was built mainly for nuclear families, but now many other household forms also influence the housing demand; smaller and older households often have residential requirements which differ from the benefits offered by the detached housing type, and by the settlement patterns which it composes.

This dissertation presents a complementary part of a research project which was started in 2010, aiming to investigate the stock of detached dwellings in Flanders, as a joint venture between the Architecture, Urbanism and Planning (ASRO) department (recently renamed to the Department of Architecture) of the KU Leuven, the division of Geography, also at the KU Leuven, and the department of Architecture and Arts at the PHL University College. Over the course of 2013, this latter department became a Faculty of Hasselt University.

In the project proposal submitted to the Research Foundation Flanders, the authors of the project addressed the problems of the considerable stock of large, detached dwellings in demographical and ecological terms, and focused on *underused* dwellings in particular: "These large homes, which are often situated in low density neighbourhoods, are at odds with a policy of sustainability, since the latter implies the need to minimize energy consumption and greenhouse gases while large homes in sprawled neighbourhoods generate high direct (heating) and indirect (transport) energy consumption. Demographic evolutions moreover point towards an increasing amount of small families and households, hence the need for large dwellings will inevitably decrease".[1] While addressing problems related to the detached dwelling, simultaneously the project has aimed to address the difficulty of resolving such problems, because home ownership is an important economical interest, and also represents emotional capital of the inhabitants, which inhibit a strictly technocratic approach to the issue. The project application therefore proposed three research tracks – the first with a geographical focus, the second with a discursive focus, and the third one with a design-based, typological focus – in order to contribute to a better understanding of the contemporary conditions, aspirations and opportunities tied to the detached dwelling. **Figure 1** demonstrates how these tracks interrelate.

Research composing the first track has been conducted in the division of Geography of the KU Leuven, by professor Dominique Vanneste, and researchers Lieve Vanderstraeten and Saartje Tweepenninckx. It has focused on the development of an operational definition of under usage, based on quantitative data of dwelling surface, the number of rooms, and the number of inhabitants.[2] Furthermore, the spatial distribution of underused detached dwellings across Flanders has been analysed and mapped. Based on this mapping, 10 municipalities with a significant share of detached dwellings were selected as case studies for field work

1. Hilde Heynen, Michael Ryckewaert, Dominique Vanneste, and Koenraad Van Cleempoel, " Large dwellings in Flanders. Development of architectural and users strategies in view of demographic trends and ecological constraints. (Onderbezette grote woningen in Vlaanderen. Een onderzoek naar architecturale en gebruiksstrategieën in het licht van demografische bewegingen en ecologische beperkingen.)", Project application, Research Foundation Flanders (FWO), (2009).

2. These data were collected in the Socio-Economic Survey (SEE) of 2001, which is the most recent census.

in the second research track. This second share of the project was conducted by Wouter Bervoets at the department of Architecture, KU Leuven, and consists of qualitative research among inhabitants of detached dwellings. Within this trajectory, the housing experiences and aspirations of these inhabitants were documented during home visits. These perspectives of the inhabitant have led to a better understanding of the inertia of residential neighbourhoods and dwellings.

This dissertation reports of the third track, which in the project description has been defined as *typological* and *designerly research*. The typological research aimed to make a distinction among detached dwellings in order to determine which type would be suitable for adaptive reuse, envisioning alternative inhabitation patterns in order to cater to changing housing needs. The dwellings and neighbourhoods of the respondents from the second trajectory were used as data-input for this third research track. This doctoral project hence aimed to investigate the potential of under usage, by looking into the feasibility of redesigning large dwellings in the light of a changing demographical composition of the Flemish population. The applicants wrote about this design-based approach to research: "this section will explore how to transform the existing morphological and spatial structures to produce a better fit with changing socio-economic structures".[3]

Over the course of the project, the primary findings of all three research tracks further defined what precisely this design-based approach should consist of. Neighbourhoods consisting mainly of detached houses are mostly located in decentralised areas. Making more efficient use of the investments made in buildings and infrastructure in such locations also needs to take into account higher-level efficiency, such as on the level of the municipality or the Flemish region. Therefore, viewpoints ranging from (interior) architecture to regional planning need to be involved in this study. Furthermore, at its start, the project hypothesised finding

3. Heynen et al., "Large dwellings in Flanders", 8 (pages not numbered).

opportunities for adaptive re-use of houses and neighbourhoods as a result of changing demands, combined with an emotional attachment of inhabitants to this residential environment. Such attachment could provide the necessary project brief for design exploration. Initial results quickly demonstrated that the many factors, such as limited interest from interviewed respondents, professional positions, and theoretical concepts, propose critical arguments and resistance vis-à-vis dwelling transformation. This required a re-conceptualisation of the design-brief interaction in the context of this research.

A number of basic principles therefore compose a general framework, serving as a project brief on a meta-level, which allows for the involvement of design practice. The first principle is based on the acknowledgement that the residential environment needs to develop towards a higher level of sustainability and adequacy. This involves dealing with those neighbourhoods which are already built, and where change is most urgent, and to do this as an alternative for further urbanisation of vacant land.[4] The second principle, is that such process would lead to higher densities and more diversity in the housing stock, in such a way that more efficient land use and mobility can be obtained in a small country with a perspective of a growing population. This dissertation argues, that typical neighbourhoods consisting of detached dwellings require reconsideration. At the same time, societal and technological issues resist this reconfiguration. This dissertation therefore proposes a design-based enquiry both geared at unveiling the nature of these issues of resistance, and testing design approaches available to negotiate such resistance, and to propose alternative design paths to overcome it. Consequentially, this research track proposes consecutive steps which iteratively study design concepts in the light of diverse theoretical frameworks. Each chapter reports of a partial answer, a piece of the puzzle, but also leads to further insight of the size and complexity of the puzzle which is this research topic. This complexity urges for

4. This means land without buildings or infrastructure on it; of course , this land is often not ‘vacant, but in use for agriculture or recreation, or with a natural and ecological role.

complementary methods of finding and placing the right pieces. Qualitative research, architectural analysis and design therefore consecutively are used to enquire into the stated problem and to obtain a clear view of the feasibility of transformation strategies. **Figure 2** visualises this process. As such, the research project follows a specific approach of dealing with saturation of results. In social sciences, saturation is a condition when a research has provided such a level of information, that continuing the same line of questioning within one single defined group will not deliver more new insights.[5] From there on, solid conclusions on a phenomenon can be drawn, or conditions may be redefined to conduct additional research, leading to complementary data. Recalibration is essential in the case of this project. For example, the documentation of protest against a certain development strategy could provide a clear answer to sociological questions, but since it is the ambition of this dissertation to outline efficient architectural strategies geared at transformation, the documented protest, mistrust or reluctance, lead to further enquiry in order to find out how designers can respond to such resistance.

While the initial project outline remains close to the scale level of the house itself, the developed approach required a broader spectrum of possible pathways, including more radical strategies for dealing with the detached dwelling. To cover most varieties of imaginable pathways, three distinct strategies are formulated, which are defined by *reconfiguration*, *replacement* and *removal* of existing dwellings (**figure 3**). The *reconfiguration* strategy envisions an incremental adaptation of dwellings and infill projects on lots in low-density neighbourhoods. The *replacement* strategy projects the implementation of large-scale projects, partially replacing a part of the detached dwellings in such neighbourhoods. The *removal* strategy explains demolition followed by landscape restructuring in peripheral residential areas as a consequence of striving for more compact housing closely attached to urbanised centres. These strategies serve to explore

5. The concept of saturation is for example developed in the work of Gläser and Strauss who developed grounded theory. See Barney G. Glaser, and Anselm L. Strauss, *The Discovery of Grounded Theory, Strategies for Qualitative Research*. ed. by Howard S. Becker, *Observations* (Chicago: Aldine Publishing Company, 1967). Proclaiming the achievement of saturation requires sufficient data, which the author believes to be the case taking into account the number of performed interviews and analyses. Qualitative researchers Guest, Bunce and Johnson determined on the basis of their own work that after 12 interviews, saturation started to occur. See Greg Guest, Arwen Bunce, and Laura Johnson, "How many interviews are enough? An experiment with data saturation and variability," *Field methods* 18, no. 1 (2006): 59-82.

and communicate alternative future developments. Although these strategies facilitate a perspective beyond one single scale level, the project was developed in an environment of exchange between architecture and interior architecture. This leads to a relatively strong emphasis of adaptation of the residential environment on the level of the dwelling.

This introduction will further elaborate the theory and approach at the foundation of the developed research track as displayed in **figure 2**. A first essential part, which is elaborated in the following section, is formed by a discussion of the Flemish residential landscape and the role of politics, architects and planners in its genesis. This is followed by an elaboration of the problem issues of the detached dwelling and the conditions of sprawl. Subsequently, in greater detail the methodology will be discussed in terms of theory and the selection of case studies. This introduction is concluded with a discussion of the disciplinary positioning of the author, which also significantly determined the research pathway reported of in this dissertation.

Genesis of the housing model: the role of architects, planners and theoreticians

The Belgian territory is considered to be nearly completely urbanised. Especially the Flemish region is densely built. The single family house on its proper lot forms a large share of the built space. The housing stock in Flanders consists for about 80% of single family houses, of which 42% are detached houses, and home ownership lies far above the European average, at 74.4%.[6] According to the categorisation of the Belgian cadastre, 16,6% of the parcelled land has built structures on it, of which 11.3% is taken in by residential buildings.[7] This built-up land is spread homogenously across the entire region, leading to a very high density when looking on the (regional) macro-scale.[8] When looking on the micro-scale of the neighbourhood, typical residential allotments have a rather low residential density up

6. Pascal De Decker, Michael Ryckewaert, Brecht Vandekerckhove, Ann Pisman, Frank Vastmans, and Marie Le Roy, *Ruimte voor Wonen, Trends en Uitdagingen* (Antwerpen, Apeldoorn: Garant, 2010).

7. See the analysis of Etienne Van Hecke, "Ruimtegebruik in Vlaanderen, studie uitgevoerd in opdracht van de Vlaamse Milieumaatschappij, MIRA", (Leuven: KU Leuven, 2003). In comparison, In the Netherlands, land use consists for 9,5% of built-up terrains. CBS, PBL, and Wageningen UR, "Veranderingen bodemgebruik, 1979 – 2008 (indicator 0060, versie 08, 9 december 2011)", CBS, Planbureau voor de Leefomgeving, Wageningen UR, (2011) <http://www.compendiumvoordeleefomgeving.nl/indicatoren/nl0060-Bodemgebruik-in-Nederland.html?i=15-18> [Accessed 13 August 2013].

8. The population density of Flanders is 470 inhabitants per square kilometer (population count of 2012, see http://statbel.fgov.be/nl/statistieken/cijfers/bevolking/structuur/ [Accessed 25 February 2014]). Belgium in its entirety has a population density of 349 inhabitants per square kilometer (see http://www.belgium.be/en/about_belgium/country/Population/, [Accessed 13 August 2013]).

to about 15 dwellings per hectare, but on average closer to 4 dwellings per hectare for allotments and 1-2 dwellings per hectare for the notorious Belgian ribbon developments.[9]

The development of the contemporary Flemish housing model can be traced back to the 19th century, when the Belgian state developed, in a region which was already characterised by a dense settlement pattern. A "finely meshed railway and tramway network"[10] was implemented in this region in the course of the 19th century, while a long standing tradition of subsidising private homeownership with the first Belgian Housing Act of 1889 was initiated. This allowed workers to have a job in the city, to which they would commute from the village where they had their roots. Here, building lots were cheap, and the Christian democrat and liberal political elite hoped by this means to keep the working class out of the influence of socialism.

After the Second World War, the risen housing demand was met with the help of two laws: The *De Taeye* Act of 1948, which mainly stimulated the construction of single family dwellings all across the Flemish region, and The *Brunfaut* Act of 1949, which stimulated the construction of large-scale social housing projects, mostly in an urban context. With almost 411.000 subsidised dwellings built between 1948 and 1973, the De Taeye Act was notably the most influential for the Belgian housing development[11], as it allowed for an equal geographical spread of government subsidies, from the city to the small village. It was instrumental in cultivating the Belgian post-war building tradition of building one's own home. In addition to the housing subsidies provided by the government, spatial planning policy has strongly coloured the development of the settlement pattern and the construction culture. The *regional zoning plans*, which are based on the first Law on Spatial Planning of 1962, have determined land use for the latter part of the 20th century. These plans were drawn up as from 1972, and approved in the latter half of the seventies. Also in 1972, an additional *infill*

9. The Italian urbanist Bernardo Secchi has stated that these dispersed conditions make up the daily living space of about 45% of the inhabitants of Europe, and architectural projects need to be inscribed in this situation. Bernardo Secchi, Paola Viganò, *Urban Design in Low Density Settlements*. Public lecture, KU Leuven, 11 March 2011.

10.Bruno De Meulder, Jan Schreurs, Annabel Cock, and Bruno Notteboom, "Patching up the Belgian Urban Landscape," *OASE* no. 52, Consumption and Territory (1999): 78-113.

11. Kathrien Theunis, "De Wet De Taeye. De individuele woning als bouwsteen van de welvaartsstaat," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam, Antwerpen: 010/ Vai/ CVAa, 2006).

rule was devised in order to exceptionally allow the construction of dwellings in between built-up lots, facilitating the development of terrains which were not designated as building lot in the zoning plans. This rule consolidated the housing condition in the Flemish ribbon developments, which, lot by lot, silted up with dwellings. By 1993, this rule was abolished, as it had led to a rapid demise of open space in rural environments.[12] Until 2000, the regional zoning plans have been occasionally revised. In these plans, low density residential neighbourhoods have been acknowledged the special status of *residential park* for inhabited forests, or *residential zone with a rural character* for the ribbon developments. The 1962 Law on Spatial Planning also aimed to regulate land subdivision practices. In the early years, there was however no qualitative measure or policy document, only a juridical framework, for evaluating and approving allotment plans. Neither was there an obligation to immediately develop the parcelled lands. This led to a speculation boom, as cunning (large) landowners parcelled their lands, raising the value of their property.[13] Many of these allotment plans still form the prevailing regulation, and have been defined with strict regulations: maps depict the area of the lot which may be built upon, and an accompanying text prescribes height, typology, and materials which may be used (**figure 3**). Most importantly, these regulations determine functionality, which is usually limited to one single family dwelling per lot. The regional zoning plans and the allotment plans safeguard the functional label and the attached value of built and vacant lots for the owner. Construction of new dwellings in allotments and ribbon developments hence occurs as a procedure of filling in vacant lots, or also following demolition of aged buildings (**figure 4**). At present, the regional zoning plans coexist with a more recent legal system. Every municipality nowadays has developed a *municipal spatial structure plan* (GRS) based on the *Flemish Spatial Structure Plan* (RSV), which serves as policy document presenting the municipal perspective on spatial development. *Spatial Implementation Plans* (RUP) are the legislative instruments for implementing this policy.[14] All of the

12. Jacques Timmermans, "Voorstel van decreet van de heer J. Timmermans c.s. houdende wijziging van artikel 87 van de wet van 29 maart 1962 houdende organisatie van de ruimtelijke ordening en van de stedebouw", (Brussels: Vlaamse Raad stuk 568 (1993-1994) nr. 1, 1994).

13. Bruno De Meulder, "De Belgische Stedenbouw en de Behoefte van Welvaart 1945-1975. 10 Punten Over de Veranderende Productie van het Wonen," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam/ Antwerpen: 010/ Vai/ CVAa, 2006): 128-145; Jef Van Den Broeck, "In de Ban van Ruimte en Beleid: Relaas van een Zoektocht," *Ruimte & Planning* 25, no. 3-4 (2005): 12-34.

14. www.ruimtelijkeordening.be [accessed 26 July 2013].

territory, for which no RUP has been made yet, continue to be governed by the regional zoning plans.

In the slipstream of the legal instruments and subsidies provided by the government, socio-cultural organisations and social housing companies provided builders with advice how to build their dwelling efficiently, especially within the spatial limits which were set as conditions for a subsidy such as granted by the De Taeye Act. As a result, traditional housing typologies after the Second World War started to change in accordance with modern living: space was organised efficiently, and functional interpretations of rooms in the home, such as the kitchen, the living room, or the representative parlour, started to shift.[15] This affected the housing culture of the labour and agricultural class. The housing culture of the upper middle class became intertwined with the allotments and residential parks. After 1960, when across the Flemish territory these allotments started to appear in areas which before were not viable for development, the move of the upper middle class out of the city and into the countryside took a flight. While under influence of the De Taeye Act and diverse socio-cultural organisations, housing construction was characterised by a search for efficiency, in terms of building costs and spatial usage (so that in due time, children could also build their own house on their parents lot) during this later suburbanisation process, such stewardship was no longer of concern. Dwellings were built in order to consume the benefits of this suburban environment: privacy in a green environment, which counterbalanced the hectic city, while many who fled the city as a residence continued to commute there from the countryside. A rural-style dwelling, modelled after an invented, idyllic interpretation of the past, hence became the most appropriate form to shelter an urban lifestyle in a semi-rural environment.[16]

Architects and architectural theoreticians have mostly taken a critical stance towards this kind of housing[17], towards the

15. Els De Vos, and Hilde Heynen, "Shaping Popular Taste. The Belgian Farmers' Association and the Fermette During the 1960s and 1970s," *Home Cultures* 04, no. 03 (2007): 237-259; Kathrien Theunis, "De zoektocht naar een Belgisch woonproject, 1965-1975: toenaderingen tussen ontwerpers en overheid in de praktijk van het private wonen / The quest for a Belgian housing project, 1965-1975: approaches between designers and authorities in the practice of private housing", (unpublished doctoral dissertation, KU Leuven, 2008).

16. De Vos and Heynen, "Shaping Popular Taste": 256.

17. De Vos and Heynen, "Shaping Popular Taste": 252-253.

development of Belgian spatial planning policies, and towards the architecture which emerged as a result. Francis Strauven discusses the Belgian urbanised landscape, and the urge to parcel out the countryside, as a result of (conservative) liberal policies which were implemented since the founding of Belgium as a state in 1830.[18] He discusses the extending of an anti-urban policy after the Second World War in predominantly negative terms, since it has led to national spatial characteristic – although quite well recognisable in comparison with the neighbouring countries – of dubious quality. Belgian modernist architects are quoted by Strauven as a small group striking a different note: he reports of an ardent opposition against this post-war consumption of the landscape, most notably from the pen of the architect and urban designer Renaat Braem, disciple of Le Corbusier, who opposed government housing policies such as the De Taeye Act. This act led in his eyes to fragmentation and chaos, and he declared Belgium to be 'the ugliest country in the world'.[19] Strauven indicates that, despite this resistance, modernist architects in the post-war decades, in order to build, had no other choice than to comply with the local model of spatial production, and, failing to take a critical stance in their realised work, contributed to the onslaught of sprawl by designing solitary residential objects in allotments.[20]

This housing model partially fits the description of suburbia given by urban historian Robert Fishman.[21] Urban lifestyle, the rural landscape, and an (invented) history form the elements of a *bricolage* on the basis of which a new spatial form, escaping from the vices of city life, is defined. Fishman also describes how suburbia remained economically dependent from the central city, which is only partially the case in Belgium. Architectural historians Michael Ryckewaert and Katrien Theunis argue against the corollary that the typical Flemish landscape is purely a result of laissez-faire, emphasising that large scale planning decisions were made with a decentralised settlement pattern in mind.[22] Ryckewaert proposes an alternative account, and starts an analysis

18. Francis Strauven, "hoe belgië zijn aanblik kreeg: 150 jaar architectuur en stedebouw in belgië," *Wonen TA/BK*, no. 12 (1980): 7-22.

19. Renaat Braem, *Het lelijkste land ter wereld* (Leuven: Davidsfonds, 1968).

20. Strauven, "hoe belgië zijn huidige aanblik kreeg": 18.

21. Robert Fishman, *Bourgeois utopias: The rise and fall of suburbia* (New York: Basic Books, 1987).

22. According to Ryckewaert and Theunis, the bold statement of Renaat Braem, claiming that Belgium is the ugliest country of the world because of its lack of systematic spatial planning, should be considered a myth. Michael Ryckewaert, and Katrien Theunis, "Het Lelijkste Land, de mythe voorbij," *Stadsgeschiedenis* 1, no. 2 (2006): 148-168.

from employment centres, which equally became detached from the central city, and were organised along an infrastructural armature. This armature became the focus for development as a national project in the fifties.[23] Ryckewaert reveals how water-related infrastructure, such as the expanding port of Antwerp or the Albert Canal, and motorways, such as the route between Leuven and Lummen (linking Brussels to Aachen and Maastricht), became structuring elements for the entire territory. The infrastructural works were complemented with industrial projects, such as the settlement of heavy and light industry in appropriate locations in the Antwerp Port, along the Albert Canal, and close to nodes in the motorway-network. In their turn, these employment centres induced the development of housing projects. Architects and planners, informed by the international discourse on urbanisation patterns, such as the linear city or the garden city, proposed satellite settlements, for which logical locations were sought outside of the danger area of heavy industries and inscribed in existing settlement patterns. Because a coherent planning framework was lacking, such mechanisms are explained by Ryckewaert as *implicit urbanism* following a *minimal rationality* instead of all encompassing plans.[24] The conceptual satellite cities, developed in close connection to the industrial armature, were only executed sporadically and in fragments, mainly because of changing economic and social conditions.[25] Increased car-ownership allowed workers to commute to their work from more remote locations. This reinforced the spread of housing across the territory, although in other forms than imagined initially by involved architects.

Renaat Braem was one author of such visionary projects for linear and satellite cities, which did not develop beyond an embryonic stage. Still, Braem was not a voice in the wilderness, and following his call, Belgian architects have attempted throughout the post-war period to develop forms of residential architecture and urbanism alternative to the predominant individualised model of a family dwelling on a single lot, both outside of the city, adhering

23. Michael Ryckewaert, *Building the Economic Backbone of the Belgian Welfare State: Infrastructure, planning and architecture 1945-1973* (Rotterdam: 010 Publishers, 2011).

24. Ryckewaert, *Building the Economic Backbone of the Belgian Welfare State*, 9-10.

25. Ryckewaert explains this throughout his book as a shift from the Taylorist to the Fordist economic model: in the Taylorist model, workers are bound to the company, who provides them with housing and amenities. In the Fordist model, the company pays employees more, so that they can become consumers themselves. Ryckewaert, *Building the Economic Backbone of the Belgian Welfare State*, 129-131.

to the modernist logic of functional zoning, separating work, leisure and housing, but also in inner city contexts in the wake of rising critiques against the modernist dogmas emerging from the fifties onward. Architectural historian Geert Bekaert discusses the changing professional conception of young Belgian architects in the 1960s, who want to shift the focus of their attention from behind the closed doors towards attention of everyday problems related to the residential environment.[26] Bekaert mainly discusses initiatives to revalue existing urban tissue which was at risk of falling prey to demolition as a result of speculation: with an evasive manoeuvre towards conservation and social work, such architects attempted to redefine their discipline. In her doctoral dissertation, Katrien Theunis discusses architectural projects which looked for alternative housing concepts, in cities as well as in villages, in the years between 1965 and 1975.[27] She brings to light an ambition to develop housing projects differing from the traditional individual dwelling in terms of scale, typology, density, and including additional functions in the project brief. She argues that these projects, especially those of larger scale, encountered many difficulties because the Belgian building industry was not organised to execute them: government policies protecting the potential buyers[28] required that developers made a relatively high investment; construction companies traditionally focused on small projects and were not equipped and experienced for industrial production; and lastly, the fragmented ownership required developers to make significant investments in land purchase.

Therefore, during the sixties, seventies and eighties, housing production mainly occurs under individual commissioning, and outside of the city context. Urbanism in the sixties also developed a focus on the *object* (such as the building, or pieces of infrastructure in the city or in the landscape) without an eye for urban *coherence*, as is argued by urban designer and historian Marcel Smets.[29] He addresses this state of urbanism in Belgium in the 1960s, arguing that the coherence of the city is lost due to urban renewal projects

26. Geert Bekaert, "Het einde van de architectuur," in *1951-1991. Een tijdsbeeld* (Brussels: Paleis voor de Schone Kunsten, 1991): 197-207.

27. Theunis, "the Quest for a Belgian Housing Project".

28. The housing law of 9 July 1971, otherwise known as the *de Breyne Act*, lays down the guarantees a potential buyer of a dwelling based on a plan, or a turnkey project, rightfully has. See: http://economie.fgov.be/nl/consument/bouw/wet_breyne/ [accessed 21 August 2013].

29. Marcel Smets, "Een tijd van Vanzelfsprekendheid," in *1951-1991. Een tijdsbeeld* (Brussels: Paleis voor de Schone Kunsten, 1991): 189-195.

with a rigorous impact on historical urban tissue, and because exuberant spatial claims for traditional urban functions are made outside of the city, driven forward by a focus on the car and the road infrastructure it requires.

In 1963, the architect was granted a key position as the professional to safeguard the development of qualitative architecture and spatial planning, and the Order of Architects was established by law as the institution to control the professional training and the observance of disciplinary standards by the architects.[30] In practice, this law led to a discrepancy between the role of the architect, who is ascribed the interest in good architectural practice, and the common practice of aspirant-builders, whose interest is the roof over their heads, and who prefer to design their own dwelling. Many dwellings, as was also admitted during the conducted interviews during this research, have been signed and validated by an architect who has not drawn one line of the plan. Luc Deleu in 1983 has published a notorious manifesto as a statement against this system, by autographing and appropriating the designs of some 100 dwellings which were drawn by the owner-builders themselves.[31]

Kelly Shannon brings to light a turn in the nineties, when architects manage to inscribe more complex housing projects in urban tissue, such as the Hollainhof in Ghent, by Neutelings Riedijk Architecten, and the urban redevelopment project by De Smet Vermeulen architecten in the Sint Denijsstreet/ Zwevelgemstreet in Kortrijk.[32] She portrays these projects as hybrids combining "the Belgian bourgeois dream and the urban, public realm",[33] which is, she argues, a necessary acknowledgement of Belgian (and Flemish) housing culture in order to implement alternative residential models. At about the same time, the arguments that urbanity might equally be found outside of the traditional cores was put forward by De Meulder et al.[34] In 2002, Xaveer de Geyter Architects presented a comparable argument in their volume After-Sprawl, in which this new condition is acknowledged,

30. Wet tot instelling van een orde van architecten (Law on the establishment of an order of architects), 26 June 1963. Online: http://economie.fgov.be/nl/modules/regulation/loi/19630626_l_creant_un_ordre_des_architectes.jsp. [Accessed 20 August 2013].

31. See Luc Deleu, *manifest aan de Orde* (Antwerp: Uitgeverij Guy Schraenen, 1983). This manifesto has been partly republished in Luc Deleu, "manifest aan de Orde," in *Postfuturismus?*, ed. by Luc Deleu (Wommelgem: Den Gulden Engel, 1987): 73-76. This manifesto is further discussed in Lukas De Pauw, "Deconstructie van een Orde," in *Luc Deleu and TOP Office, 1967-1991*, ed. by Lilian Dewachter (Antwerp: MUHKA, 1991): 99-106.

32. Kelly Shannon, "Redesigning the Belgian Dream; Social housing in Belgium," *Archis* 1998, no. 8 (1998): 10-28.

33. Shannon, "Redesigning the Belgian Dream": 24.

34. De Meulder et al., "Patching up the Belgian Urban Landscape".

and, according to Geert Bekaert and Lieven De Boeck, requires a new imagery and design approach, based on the acceptance of this reality.[35] The argument which is made with this book is that architecture and urbanism are two disciplines who have the vigour to elaborate a new, proper future for this condition, beyond a bland acceptance of the status quo on the one hand, and beyond an idealisation of the concept of the classical, compact city on the other hand. Hence, two viewpoints renegotiate the ideal of the central city in Flanders from two sides: Shannon sees elements of suburbia brought into an urban context, while according to De Meulder and De Geyter, the central city no longer is the guiding concept for urban development; that sprawl, the entire territory as one big city, is the new urban condition.

The more recent volume 'Wonen in Meervoud' presents contemporary housing projects which are characterised by collectivity, in the form of outside spaces, amenities or living spaces shared between different households.[36] As does Shannon, the editors of this book describe built projects which readjust the Flemish housing dream, and, looking beyond the city, include projects which are built in a rural context, or in traditional low-rise allotments. Still, in the most recent Flemish architectural yearbook, Stefan Devoldere describes the private house as the stepping stone and the test of competency of young architects, and also as the assignment which allows the architect to confront and interpret the common Flemish housing model.[37] Such an endeavour of reinterpretation inscribes itself in a positive evaluation of certain aspects of the housing model, such as the high level of freedom for individuals when choosing their residential location and preferred housing type, or the good quality of the housing stock, as suggested by Michael Ryckewaert.[38] the qualities are even praised internationally, for example by (ex) architect Carel Weeber, who sought to make the detached dwelling more part of the Dutch planning tradition, because he saw it as an appropriate housing form for contemporary (individualistic, leisure orientated) lifestyles,

35. Xaveer De Geyter, Geert Bekaert, and Lieven De Boeck, *After-Sprawl. Research for the Contemporary City* (Rotterdam/ Antwerpen: NAi Publishers/ De Singel, 2002). Bekaert and De Boeck (who worked in the office of De Geyter) authored the introductory texts.

36. Karina Van Herck, and Bruno De Meulder, eds., *Wonen in Meervoud. Groepswoningbouw in Vlaanderen 2000-2010* (Nijmegen: SUN, 2009).

37. Stefan Devoldere, "Een aangepast woonkader," in *Radicale Gemeenplaatsen. Europese architectuur uit Vlaanderen. Architectuurboek Vlaanderen N°10*, ed. by Ilse Degerickx, Aglaée Degros, Maarten Delbeke, Stefan Devoldere, Christoph Grafe, Elke Hoornaert, Christian Kieckens, André Loeckx, Dirk Somers, Axel Sowa and Ellis Woodman (Antwerp: VAi, 2012): 162-175.

38. Ryckewaert, B*uilding the Economic Backbone of the Belgian Welfare State*, 301.

more than the omnipresent and uniform Dutch terraced houses.[39] Also Flemish politicians engaged in the current housing debate struggle with this complexity, and seek a position in between the continued popularity of the housing model, its qualities as well as its flaws, and the critical voices which claim the need for change in the light of demographical, economical and ecological shifts.[40] The genesis of the Belgian spatial planning approach has led to a very typical regional housing stock and settlement pattern, with proper problems. This brief historic overview demonstrates how critical voices address these issues on two interrelated scale levels. The first is the scale level of the dwelling itself, which represents a collective ideal of the residential environment. This ideal was gradually constructed with the help of subsidies, regulations, and socio-cultural housing advice. Urban and regional planning is the second level, because the predominant single-family dwelling has resulted in widespread, low-density (sub)urbanisation patterns, or sprawl. The following sections will further elaborate contemporary critique and expected problems in the context of this research, as an interrelated problem statement.

Questioning the detached dwelling: supply and demand

Because Flanders faces the problem of demographical developments resulting in smaller average households, partly as a consequence of an ageing population (a process expected to continue until 2050), the aptness of single family dwellings to house elderly people is of concern: such houses for a large part have been constructed by the baby-boom generation, and designed for inhabitation by a nuclear family. Now, children have left, and small, one or two person households remain living there. Elderly inhabitants might consider *ageing in place* in their self-built house, the object in which they invested time and money, but alternatively have the choice to move out to another housing unit, more close to family, a community, or basic amenities.[41] This implies that solutions are sought for on different scale levels.

39. Carel Weeber, *het Wilde Wonen* (Rotterdam: 010 Publishers, 1998).

40. The current Flemish minister of housing, Freya Van den Bossche, looks for more efficient use of space in the light of population growth, which entails a critical review of the low-density residential settlements. She further proposes more attention for the quality of the public realm instead of the focus on private property, and more residential flexibility and diversity. Her viewpoints are expressed in Freya Van den Bossche, "Wonen in Vlaanderen 2050: Krijtlijnen van een Toekomstvisie", Flemish Ministry for Energy, Housing, Cities and Social Economy, (2012) <https://www.wonenvlaanderen.be/uploads/documentenbank/c9dbbc8ee62092f878b48d895560a4cb.pdf?ht=1> [Accessed 06 June 2013]. The current Flemish minister of Spatial Planning, Philippe Muyters, in his turn has published a green paper, in which the notion of compact settlement patterns come forward, as the option to demolish suburban areas and to expand large cities, is proposed. Vlaamse Overheid, "Groenboek Vlaanderen in 2050: mensenmaat in een metropool? Beleidsplan Ruimte Vlaanderen", (Brussels: Vlaamse Overheid, Departement RWO, 2012).

41. Mary Ann Erickson, John Krout, Heidi Ewen, and Julie Robison, "Should I Stay or Should I Go? Moving Plans of Older Adults," *Journal of Housing for the Elderly* 20, no. 3 (2006): 5-22.

On the level of the dwelling, adaptations to the building are an option to keep housing supply in line with housing demand. The overarching research project hypothesised that such adaptations could go beyond technical improvements facilitating accessibility and energetic performance, but also adapt the typology of a house so that multiple small households would be able to share generously dimensioned houses. This is a practice which is currently occurring in limited numbers, and involves the transformation of existing houses as well as the new construction of residential units with an ancillary unit[42] attached to it. A number of such built objects were documented by Kimberly Vandenborne in her master thesis at the ASRO department.[43] She encountered three dwellings which were subdivided in an improvised way, without legal permission of the municipality. In most cases, this has resulted in dwelling units which do not adhere to the standard of the Flemish housing codex. The occurrence of informal subdivision raises the question, under which conditions such interventions could occur properly. Additionally, she documented a case of a dwelling which was transformed by an architect in a rigorous way, by means of a significant expansion, more than doubling the volume of the original building. Finally, one dwelling was documented as an example of a house with an attached ancillary unit which as a whole was built from scratch. While these latter two cases are built with a specific family situation in mind, continued inhabitation under different relational circumstances is more difficult, or even illegal.[44] Transformations which reassign a functional profile, catering to very particular household needs rather than a broad audience (and require a material investment which equals new construction) raise the question whether the production of inflexible buildings serving a narrow niche, pays off in the long term. Also the building from scratch of such a double unit requires specialised knowledge about regulations from the designer and contractor. In their publication on ancillary dwelling units, or *kangaroo housing* as it is popularly called in Flanders, Coopmans and Verraes relate of the experience of one of such specialised

42. An ancillary unit, popularly termed kangaroo house, is a small residential unit attached to a traditional house, usually designed to house a care-requiring family member.

43. Kimberley Vandenborne, "Alternative forms of inhabitation of post-war detached houses in Flanders/ Alternatieve vormen van bewoning van naoorlogse vrijstaande woningen in Vlaanderen" (unpublished Master thesis, KU Leuven, 2012).

44. Ancillary units, installed for care purposes, need to become part of the single family dwelling when the care-requiring household seizes to live in the building, unless a spatial planning permission for subdivision has been granted. Vlaams Ministerie Ruimte Vlaanderen Woonbeleid en Onroerend Erfgoed, "Vlaamse Codex Ruimtelijke Ordening", (Brussels, 2009): 57.

contractors, the firm *Young Budget Homes*, and present the shared dwelling as a contemporary typology which is best inscribed in the predominant Flemish housing model, and thrives in low-density, car-oriented environments.[45]

While it is argued to be a fitting typology for the Flemish suburban residential environment by such authors as Coopmans and Verraes, the specific character of a house with an ancillary unit, and the limited timeframe for which such units are usually developed, make it difficult to fit the concept into the Flemish housing market. Also, the project team had to acknowledge the results emerging from the test phase of the second research track, which showed very limited interest among home owners to let go of the concept of the detached dwelling by subdividing the home into two housing units.[46] The persistence of the housing model which is described as the Flemish dream[47], and which consists of ownership of a detached dwelling in a green and quiet environment, strongly comes to the fore. These provisional findings urged for a critical investigation of the project of subdividing or transforming a detached dwelling in a low-density environment. The question may be asked, whether it would be a fruitful strategy to follow, and could it serve alternative housing needs emerging in the Flemish society? Hence, the problem of fitness of the house needs to be related to the problem of dispersal. To this cause, a consultation of concepts regarding sprawl is in order.

The issue of sprawl

In modern urban history, the detached dwelling is mentioned to be one of the principal building stones in expansive settlement patterns, rather detached from central urban cores. Such contemporary sprawl is seen as the result of post-industrial social and technological developments, which have led to a reversal of the movement towards the central city in the era of industrialisation. From a general viewpoint, sprawl can be read as a form of spatial practice which incrementally consumes rural

45. Femke Coopmans, and Wolfgang Verraes, *Kangoeroewonen: een mens- en budgetvriendelijk woonidee* (De Pinte: Wolfgang Verraes, 2005).

46. Results of the second research track are published by Wouter Bervoets, and Hilde Heynen, "The obduracy of the detached single family house in Flanders," *International Journal of Housing Policy* 13, no. 4 (2013): 358-380. Also see Wouter Bervoets, and Marijn van de Weijer, "Paradoxen van landelijk wonen in Vlaanderen," *Agora* 28, no. 1 (2012): 34-38.

47. Pascal De Decker, "Understanding housing sprawl: the case of Flanders, Belgium," *Environment and Planning A* 43, no. 7 (2011): 1634-1654.

landscapes, inducing a functional shift from an agricultural space into a space of consumption for urbanites. It can be read as "a complex of functional changes, followed by morphological and structural ones", and, "it should be regarded as a diffusion wave of changing life-style mainly controlled by the changing accessibility of places offering new opportunities".[48]

Urban historian Robert Fishman traces the urban exodus back to 18th century London, when middle class groups moved into rural-style detached houses in the green countryside close to the city, in order to escape from the pollution and greyness of industrialisation, and also from the decadence of urban life.[49] Sprawl, as is argued by Fishman, does not have a plan of attack, or a utopian vision behind it, which is found in projects such as Ebenezer Howards Garden City (in the British context), The Radiant city of Le Corbusier (in the French context), and Broadacre City of Frank Lloyd Wright (in the context of the United States).[50] These projects aim to organise a clean and healthy residential environment not just for the nobility or the bourgeoisie, but for the masses. Sprawl is rather the result of an opportunistic system and of many individual initiatives, but also is described in positive accounts. In his seminal work on Los Angeles, architectural historian Reyner Banham discusses this sprawling Californian city as an example of a 'great city' in a post-urban era, and praises exactly the conditions which allow for these individual initiatives.[51] He constructs four *ecologies* which have been the preconditions for the creation of remarkable fragments of urbanity and architecture. The beach became the ecology for a typical coastline lifestyle, the foothills became the half-wilderness ecology for affluent inhabitants (think of Hollywood and Beverly Hills) and the plains became the field where en masse urban homesteads were provided. The fourth ecology, the network of motorways, facilitates the mobility in this sprawling city.

Banham's reading clashes with the more utopian architectural viewpoints, which were more critical of sprawl. In contemporary

48. Marc Antrop, "Landscape change and the urbanization process in Europe," *Landscape and urban planning* 67, no. 1 (2004): 24.

49. Fishman, *Bourgeois Utopias*, 22.

50. For a critical discussion of these projects, see Lewis Mumford, "The Future of the City, 1962-1963," in *Lewis Mumford: architecture as a home for man*, ed. by Jeanne m. Davern (New York: Architectural Record, The McGraw-Hill Companies, 1975): 103-144. and Robert Fishman, *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright and Le Corbusier* (Cambridge: The MIT Press, 1982).

51. Reyner Banham, *Los Angeles: The Architecture of Four Ecologies* (London: Allen Lane, 1971).

literature, the condition of sprawl is mostly discussed in such critical terms. The flight of the middle class from cities towards low-density suburban neighbourhoods, as argues Anne Power, has exacerbated difference between social classes, because poverty remains a problem residing in the cities; even more so because sprawl also involves the decentralisation of work and economic activities (which means the move out of cities, requiring workers to come by car).[52] Ecologists consider sprawl to have detrimental effects on the environment, however it is difficult to actually pinpoint the precise role of sprawling settlements in these problems. The car dependence which is inherent to sprawl causes increased levels of air pollution and energy consumption, an effect which may also be described to the dispersed construction of built volumes with little compactness, that furthermore results in monotony and loss of landscape quality and biodiversity.[53] While pollution has an evidently negative impact on people's health, the American medic Howard Frumkin relates sprawl and its inherent lifestyle to many other harmful effects, such as a decrease in fresh water supply, or a less active, sedentary lifestyle and mental stress due to increased car usage.[54]

Many of these concerns also apply to Flanders. In his PhD thesis, Han Vandevyvere relates this low compactness directly to the high level of energy consumption in Belgium, compared to other countries in (Western) Europe.[55] Since the larger part of the stock of detached dwellings is built in areas remote from traditional urbanised centres, and disconnected from main nodes in the public transport network, inhabitants are mainly car-dependent. The detached dwelling is therefore not only associated with high levels of primary energy consumption, but also with high levels of secondary, car based, energy consumption. Vandevyvere in response argues for an urban development policy in which densification strategies have a place alongside unbuilding strategies, implying aged houses in remote areas could be demolished.[56]

52. Anne Power, "Social Exclusion and Urban Sprawl: Is the rescue of cities possible?," *Regional Studies* 35, no. 8 (2001): 731-742.

53. An elaborate overview of environmental impact caused by sprawl is given in Michael P Johnson, "Environmental impacts of urban sprawl: a survey of the literature and proposed research agenda," *Environment and Planning A* 33, no. 4 (2001): 717-735.

54. Howard Frumkin, "Urban sprawl and public health," *Public health reports* 117, no. 3 (2002): 201-217.

55. See Han Vandevyvere, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen" (unpublished doctoral dissertation, University of Leuven, 2010). Han Vandevyvere has also been involved as an assessor of this research project from 2010 until 2013.

56. Vandevyvere, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen", 436.

(Re)formulating the research questions

These two problem issues come together in the detached dwelling. A perpetuation of the traditional mode of housing production can be questioned for not addressing the aforementioned critiques on sprawl. Still, the sprawling settlement pattern needs to be taken into account as the given situation, rooted in Flemish culture, history and morphology, in which transformation needs to be inscribed. The initial intention of this research track was to answer the question *how to* subdivide detached dwellings and to develop strategies for implementation of alternative residential typologies. As a result of the provisional outcomes at the start of the project, the first research effort has been to critically reformulate this question as follows: Which specific architectural strategies, addressing the detached dwelling, are suitable for transforming low density residential neighbourhoods, how can these be implemented in the specific Flemish context, and which are the underlying paradigms? And what are the most fundamental aspirations of involved stakeholders (specifically inhabitants, spatial planners and designers) in consideration of maintaining or readjusting the housing model consisting of large, detached dwellings in a low density environment; which alliances and paradoxes exist between these interests? of diverse strategies beyond subdivision of dwellings, on different scale levels, and involving diverse viewpoints on the detached dwelling.

A parallel research question that emerged as a result of the readjustment of this scope, was how to interpret and implement the concept of *research by* or *through design*, a broadly used concept in architecture and other design disciplines, susceptible to very diverse interpretations. In the ensuing section on methodology, these intentions will be further explained.

About methodology: the detached dwelling, research and design

The interaction between the three interdisciplinary research tracks

(see **figure 1**) required a common vantage point. The shared method used throughout the project is the study of cases. The value of *case study research* in this context lies in the quality to add an in-depth, real-life perspective, in addition to the analyses of quantitative data, based on the socio-economic census in this situation. Case studies typically reveal rich narratives and context-specific conditions, which allow for a connection of statistical data to the complexity of everyday life situations.[57] These rich narratives moreover allow for a transfer of knowledge between diverse interested disciplines, which can elaborate on the proposed analysis from their own distinct perspective. Also, case studies revolve around concrete situations which forces involved actors to express and explicitly formulate statements about the everyday reality – in this case the residential environment. Case studies are therefore also suitable to establish an exchange with more experimental research approaches[58], which in the case of this project is manifest in the involvement of design perspectives.

Case study research as an overarching method also allowed the involvement of diverse sources, such as interview data, artefacts, drawings, planning documents, and observations.[59] It allowed for an integration of design instruments in its toolset, and as such, a common thread of designerly research has been woven into this particular research track. This required that a proper interpretation of research through design is developed.

Put on the agenda by Christopher Frayling in the British academic context of the 1990s, designerly research was used as a concept for positioning artistic and designerly output of Art Schools in Britain next to more traditional scientific output of more established academic fields.[60] Also in European schools of architecture, the concept was embraced after the Bologna protocol urged architectural schools to engage in scientific research. Simultaneously, interest grew in institutions outside of Europe.[61] The specific interest for research through design in the context of

57. Bent Flyvbjerg, "Five misunderstandings about case-study research," *Qualitative inquiry* 12, no. 2 (2006): 219-245.

58. According to the definitions of Robert K. Yin, *Case Study Research: Design and Methods, Fourth Edition*, *Applied Social Research Methods Series* (London: Sage, 2009).

59. Especially interview results and observations, which allow for study of contemporary situations and the involved actors, are specific data sources for case study research, according to Yin, *Case Study Research*, 11.

60. Christopher Frayling, "Research in art and design", (London: Royal College of Art, 1993).

61. See the report of the European Association for Architectural Education for architectural research in a European context: European Association for Architectural Education (EAAE), *Charter for Architectural Research, A Declaration and a Framework on Architectural Research* (Chania: European Association for Architectural Education (EAAE) Research Committee, 2012) <http://www.eaae.be/web_data/documents/research/120903EAAECharterArchitecturalResearch.pdf > [Accessed 07 November 2012]. Biggs and Büchler draw a comparison between Scandinavia, Britain and Brazil: Michael A. R. Biggs, and Daniela Büchler, "Architectural Practice and Academic Research," *Nordic Journal of Architectural Research* 20, no. 1 (2008): 87;

this project actually lies in the search for a proper research culture at the Faculty of Architecture and arts at Hasselt University.[62]

In Dutch speaking regions, research through design is widely used, also outside of academia, where it mainly refers to the practice of producing design as a means to study complex, spatial problems. The argument for such a design approach is that these complex spatial issues resist scrutiny from one singular, disciplinary perspective, and require a projective approach, in order to unveil spatial potential and quality of a specific location, and has no pretention to be implemented or built as such: these projects are used as levers to incite the complicated development process and to breach impeding barriers. Most often, such research through design addresses the urban or regional scale. Especially the City of Antwerp has pioneered the application of this strategy.[63] Because of the wide usage of this term, research through design has become a rather vague concept, which required clear choices in the path to follow in order to be able to inscribe design in this interdisciplinary research project.

This research aims to contribute to the knowledge as well as the design of more sustainable settlement patterns, based on a thorough investigation of settlement patterns which already exist and which will form the basis of future design practices. Designing therefore has been used as an instrument to investigate under what circumstances a feasible transformation of dwelling or neighbourhood could occur. It further has been used to document the spatial, social and technological factors which obstruct or prohibit the implementation of alternative spatial patterns in low-density neighbourhoods consisting of detached dwellings. In addition, it has also been used to discover parameters which could point out an overarching, common interest which could serve as a foundation to implement change in a rather inert, residential environment. It has been developed based on place-specific data, derived from the case study research.

Michael A. R. Biggs, and Daniela Büchler, "Rigor and Practice-based Research," *Design Issues* 23, no. 3 (2007): 62-69; the work of Downton is an exponent of Australian interest in research through design. Peter Downton, *Design Research* (Melbourne: RMIT University Press 2003).

62. Until the academic year of 2013-2014, this faculty was a department in the PHL University College (Provinciale Hogeschool Limburg). As a consequence of the Bologna Protocol of 1999, studies at academic level (such as architecture and interior architecture) which were taught at Flemish university colleges, were integrated in the universities. See also *Hervorming hoger onderwijs goedgekeurd*, press release of the cabinet of the Flemish minister of Education Pascal Smet, 5 July 2012. Online: http://www.ond.vlaanderen.be/nieuws/2012/0705-ho.htm [Accessed 11 August 2013].

63. The Dutch term commonly used is *ontwerpend onderzoek*. See for example: Team Ontwerpend Onderzoek, *Ontwerpend Onderzoek als Methodiek. Kandidatuur Vlaamse Planningsprijs 2012* (Antwerp: City of Antwerp, 2012).

Ten Flemish cases

The project has revolved around ten cases which provided the full complexity and specificity to apply the chosen methods. These ten cases were chosen from the municipalities with the highest scores on dwellings showing 'under usage' and the part of the housing stock marked as 'detached dwellings' in the geographical analysis of the first research track on the level of the Flemish region. Another criterion for selection was a taxonomy of municipalities, which led to the selection of a group of municipalities in the large urban agglomerations of Brussels, Antwerp and Ghent, in the urban fringe of regional cities, in the wider commuter zone of main cities, and of rural municipalities. This led to the inclusion of municipalities which actually have a relatively low percentage of detached and underused dwellings, such as Aartselaar, a municipality in the urban fringe around Antwerp, and Aalter, near Ghent. This also resulted in the geographical spread of the cases across the region. **Figure 5** shows the location of all municipalities on the map of Flanders. Data were gathered across all three tracks by means of semi-structured, in-depth interviews, through focus groups meetings, by the gathering of spatial planning documents and drawings from the archives of designers, and by means of architectural documentation of selected neighbourhoods and dwellings in the municipalities.

The mapping of this data on the scale level of statistical sectors allowed to make a more precise account of the underused dwelling per neighbourhood or neighbourhood fragment. To isolate morphological neighbourhood units, the statistical sectors which stand out because they have a high percentage of under usage, were superimposed on topographical maps and satellite photographs.[64] This led to the selection of recognizable neighbourhood entities, or ribbon developments, if present in the statistical sector. In the selected area, invitational letters were delivered by the researchers in order to find inhabitants willing to act as respondents. Additional respondents were found by means

64. For this purpose, *Google Earth* and plans of the Belgian Cadastre (situation of 2009) were used.

of snowball sampling.[65] Based on the project brief, the aim was set to find 6 inhabitants in each municipality[66], adding up to a total of 60 interviews. In some municipalities, the response was high, and resulted in additional interviews, while in other municipalities, the aim of six respondents was not met. In the end, 65 interviews were conducted in the 10 municipalities, and the spread of respondents can be read from table 1.1.[67] Besides the interview, the dwellings visited were documented for the typological research of which this dissertation reports.

65. Mouth to mouth advertisement of interested respondents among their acquaintances led to additional participants.

66. The project brief proposed to do 60 interviews with inhabitants in total, the first 10 as a test, in preparation for the main 50 interviews.

Tabel 1.1: overview of case study municipalities and neighbourhoods.

municipality	**neighbourhood**	**Indicative density: dwellings/hectare**	**No. of households**
Aalter	Loveld (residential park)	2,5	4
	Kestelstraat (ribbon)	2,6	1
Aartselaar	Bruynenbaert (allotment)	12,2	4
	Lindenbos (allotment)	8,7	3
	Pierstraat-Oever-Kleistraat (ribbon)	2,2	2
Alken	Grootstraat/Bulstraat (ribbon)	2,1	6
Keerbergen	Golf en Meer (residential forest)	2,4	8
Lubbeek	Hoog Linden (allotment)	3,1	5
	Steenveld (allotment)	2,8	3
Lummen	Laren/Groenlaren (ribbon)	3,1	4
	Other (snowball sampling)	-	1
Overijse	Marnixbuurt (allotment)	7,6	3
	Kroendaalplein (allotment)	4,0	2
	Other (snowball sampling)	-	2
Retie	Hodonk/ Goor (allotment)	1,9	4
Sint Martens-Latem	Deurle (residential forest)	3,9	7
Wortegem-Petegem	Oudenaardseweg, Moregem (ribbon)	1,5	2
	Tjammels (ribbon)	3,2	2
	Kortrijkstraat (ribbon)	0,8	1
	Other (snowball sampling)	-	1
total			**65**

To find these respondents, in a number of municipalities the researchers also needed to consider multiple statistical sectors; this was especially the case for those areas with a low housing density, such as Wortegem-Petegem. The selection resulted in a representative sample of typical Flemish residential environments, which reoccur throughout the entire region, and, as De Meulder argues, fragmentise the landscape into an isotropic patchwork of urban and rural shards.[68] The three main neighbourhood types found in this sample are the allotment, the residential park, and the ribbon development. The allotments are mainly the result of the urbanisation process which occurred between 1960 and 1980. Especially the larger allotments were projected on stretches of land which belonged to one single owner. The selected allotments in Aartselaar, Retie, Lubbeek and Overijse (**Figures 6-13**) were developed on land belonging to domains of local nobles and abbeys. The latter three were developed in afforested domains. The residential parks in Aalter, Keerbergen and Sint Martens-Latem (**Figures 14-19**) also used to be forests, which had not been used for agriculture because the soil was less fertile. These forests were already subdivided earlier on for small country houses owned by bourgeois citizens of the nearby cities. After the Second World War, these domains of holiday and temporary accommodation, become ever more established, and were equipped with necessary infrastructure for permanent residence.

The investigated ribbon developments connect small villages and hamlets to one another: Moregem, in the municipality of Wortegem-Petegem, Laren, in the municipality of Lummen, and Wimmertingen, in Alken (**figures 20-25**). These hamlets are now merged into the structure of the ribbon developments, rather than the other way around. These current ribbon developments combine an urban and a rural lifestyle[69]; the front of the houses connects, via a driveway and a connection to all necessary infrastructure, to the world of the city, while the backside opens up to agricultural land, via the garden, sheds and stables. This open land is hidden from

67. The reported densities have been calculated on the basis of fragments of 25 ha (500x 500m), per visited dwelling; this indicative density is an average per neighbourhood. The total number of visited houses throughout the project amounts to 65. In the ensuing chapters, the actually considered number of dwellings and respondents differs according to proper selection criteria (discussed in chapter three and four respectively).

68. Bruno De Meulder, "Old Dispersions and scenes for the Production of Public Space: The Constructive Margins of Secondarity," *Architectural Design* 78, no. 1 (2008): 28-33.

69. Bruno De Meulder, "Lintbebouwing: algemeen én Belgisch," *Stedebouw & Ruimtelijke Ordening* 86, no. 4 (2005): 40-43.

70. De Meulder, "Lintbebouwing: Algemeen én Belgisch": 41.

view by the row of houses. The case of Alken shows how some of these ribbon developments are historically rooted. The selected statistical sector in the past consisted mostly of farmhouses: along the streets depicted in **figure 25**, showing the situation in 1964, the square courtyard farmhouse is the most dominant typology. A comparison to the situation of 2009 reveals that many of these farmhouses vanished and the single-family dwelling now dominates these historical ribbons – it is furthermore colonising the minor, secondary roads.

The selected residential neighbourhoods are attached to infrastructural networks in different ways, which facilitate inhabitation. The allotments are structured as a network of residential streets, designed to limit through traffic, by means of cul-de-sacs, or by means of narrow, speed-limiting paving. These structures connect to larger collector roads. Residential parks such as in Keerbergen, or Sint Martens-Latem, show a fine maze of streets, which are also equipped with necessary utilities, such as water, sewerage and electricity, to serve the houses already built, and with some added potential to allow for future construction (**figure 19**). The ribbon developments are rather a consequence of the presence of infrastructure, as equipped roads opened up the countryside for urbanisation.[70] **Figure 26** shows this for a ribbon development in Wortegem-Petegem; the main connector road brings all necessary utilities into a landscape which is further defined by an interplay of an agricultural system and a water system.

Complementary viewpoints: theoretical and epistemological differentiation

Thus far, the argument has been made that the detached dwelling embodies a combined problem, of the lack of fitness on the level of typology and of the lack of sustainability on the level of urban design and regional planning. Case study research has been proposed as a shared methodology in this interdisciplinary

research project, and this particular contribution has an interest in enquiring in what way transformations can be brought about in the context of this environment, in order to obtain a better fitting, more sustainable residential pattern. This section will explain how several perspectives and theories were brought together to tackle these problems in the chapters composing this dissertation (also see **figure 2**). Chapter two and three are based on manuscripts accepted for publication, which were prepared in co-authorship with other members of the project team. The ensuing chapters are original texts.[71]

Chapter two, reporting of a literature study, discusses the epistemology of *research through design* based on a comparison of the diverse perceptions encountered.[72] It aims to surpass the unproductive contradictions between diverse approaches of relating the practice of design to the practice of research in the field of architecture. It does so by framing *research through design* next to science, engineering, and professional design practice in a field determined by the tensions between problem solving and problem defining on the one hand, between analysis and mimesis on the other hand. *Research through design* can be exercised in different manners, which are determined by some form of transdisciplinary exchange with one or multiple other disciplinary fields.

The complexity of the Flemish housing model required such transdisciplinary viewpoint, which is proposed here in a structure of consecutive, complementary studies. In its entirety, this research is based on the combination of instruments of analysis and production derived from architectural design practice, with theory and concepts from various scientific fields: most importantly Design Methodology, History and Philosophy of Science, Cognitive Science, Sociology of Technology, and Futures Studies. The analysis of practice-based research has led to the formulation of a leitmotiv which is enquired into throughout the dissertation, involving the practice and instruments of design as

71. In accordance with the regulations of the Arenberg Doctoral School, KU Leuven, The dissertation is composed of accepted publications (chapter 2 and 3) and original texts (the introduction, chapters 4, 5, and 6, and the conclusion). See article 11 of the General Regulations of the Arenberg Doctoral School, Science, Engineering and Technology Group, KU Leuven, Approved by the Executive Committee, 11 September 2013.

72. This chapter is based on a manuscript accepted for publication: Marijn van de Weijer, Koenraad Van Cleempoel, and Hilde Heynen, "Positioning Research and Design in Academia and Practice. a Contribution to a Continuing Debate," *Design Issues* 30, no. 02 (2014): 17-29. Van de Weijer is the first author of this manuscript.

a multiform partial methodology. The focus lies with the three basic *strategies* for the development of low-density residential neighbourhoods, which relate to diverse *scenarios* for possible futures: reconfiguration, replacement and removal. Because of the nature of the problem definition, and because of the architectural origin of the project, the perspective alternates between an equal evaluating and comparing the three strategies, and zooming in to the dwelling to uncover its potential within one single overarching strategy. The term scenario here is understood as a method, commonly used in politics, planning and military strategy, to deal with complexity and uncertainty of the future, by studying contemporary conditions and imagining how these conditions could evolve in the future. Uncertainty is the basic drive behind scenario thinking; it requires politicians, planners, or companies to think out more than one option for the future for determining their current-day course of action. Without uncertainty, and multiple scenarios, thinking about the future would rather become a forecast. Christian Salewski, in his study "Dutch New Worlds", gives an overview of how scenario thinking was first used by US military analyst Hermann Kahn during the cold war, and later on became an instrument for national planning departments, for example in France and the Netherlands.[73]

73. Christian Salewski, *Dutch New Worlds: Scenarios in Physical Planning and Design in the Netherlands, 1970-2000* (Rotterdam: 010 Publishers, 2012).

This design-based leitmotiv is developed in relation to a theoretical framing of the environment composed of detached dwellings. Flemish residential tissues, as studied in this dissertation, are built up from houses which can be seen as simple elements, and the owner is granted relatively high freedom in manipulating or determining this micro-environment. These houses are replaceable elements, but depend on more complex systems which uphold a certain permanence in the residential environment. These systems include legal frameworks as described above; landscape aspects, such as the characteristic *ecologies* of Los Angeles, which suited specific kinds of architectures, as documented by Reyner Banham; and infrastructural and economic *backbones* as shown by Michael

Ryckewaert for the Belgian territory. Furthermore, the allotment, the ribbon development and the residential forest, are seen as results of processes of urbanisation.[74] The studied residential neighbourhoods can consequentially be considered as *artefacts*, in line with the argument made in a study by Eduardo Aibar and Wiebe Bijker of the urban development of Barcelona: "the size and distribution of its streets, sidewalks, buildings, squares, parks, sewers, and so on can be interpreted as remarkable physical records of the socio-technical world in which the city was developed and conceived".[75]

The exploration of this *sociotechnical* dimension led to the coupling of study of built form as well as the viewpoints of involved professional actors. This reformulation process sought to balance technical and social aspects of the issue at hand. Both of these aspects are used to find arguments for and against the possibility of transformation; in other words, a certain project brief and spatial analysis are brought together. This is in line with a social constructivist approach, and acknowledges that a technological object, or a system of objects, acquires a certain meaning within a certain societal context, which is coloured by specific ways of using and interpreting these objects.[76]

Chapter three opens up this analysis as it presents the results of qualitative analysis of interviews with inhabitants of detached dwellings in four out of the 10 case study municipalities, in reaction to the three spatial development strategies, and the scenarios under which such developments would come about, which served as a basis for these interviews. The responses were used to discover what kind of resistance could be encountered, but also what kind of overarching interest could be found as a foundation for neighbourhood transformations.[77] The spatial consequences of projecting development strategies, derived from literature study, on a typical fragment of a residential neighbourhood, were condensed in drawings of a generic neighbourhood fragment. During the

74. De Meulder et al., "Patching Up the Belgian Urban Landscape".

75. Eduardo Aibar, and Wiebe E Bijker, "Constructing a city: The Cerdà plan for the extension of Barcelona," *Science, technology & human values* 22, no. 1 (1997): 23.

76. Wiebe E Bijker, *Of Bicycles, Bakelites and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge: the MIT Press, 1995).

77. This chapter is based on a manuscript submitted for publication: Wouter Bervoets, Marijn van de Weijer, Dominique Vanneste, Lieve Vanderstraeten, Michael Ryckewaert, and Hilde Heynen, "Towards a sustainable transformation of the detached houses in peri-urban Flanders, Belgium," *the Journal of Urbanism: International Research on Placemaking and Urban Sustainability* (forthcoming). Bervoets and van de Weijer are the joint first authors of this publication.

discussion with respondents, also the institutional, social and economic parameters were explained as scenario-characteristics. Here, the design instrument of sketching is used to render visual overviews for communicating the strategies with respondents. This approach was chosen for two main reasons. Primarily, because of the expectation that a combined verbal and visual account of possible futures as a part of qualitative data gathering would result in rich data, since visualisation brings detailed information in a compact manner, which can be read in a single glance. This expectation is based on the *critical artefact methodology*, which is developed by industrial designer Simon Bowen in his PhD thesis.[78] Bowen developed this methodology "to support practical methods that employ critical artefacts to foster innovation",[79] a critical artefact being a design concept which is discussed with stakeholders (professionals and potential users) to overcome the problem that users cannot give information about something they do not know to exist or to be possible. In the context of urban development, inhabitants were expected to be inhibited by knowledge of local regulatory limitations and well-known concepts available on the housing market. Visualisations of potential strategies aimed to overcome such inhibitions, and furthermore were expected to elicit detailed and unexpected responses. Secondly, the proposal of abstract sketches rather than detailed plans for the neighbourhoods of respondents, were intended to reassure that no concrete plans were in the pipeline for their neighbourhood, in order to be able to discuss the concepts more freely and without a sense of threat. The abstraction furthermore allowed the respondents to project these strategies on their own neighbourhood: often they led to reactions such as *this could very well happen in our street ...* or *this would be more suitable for the close by village of ...*

The discussion of transformative strategies with inhabitants inevitably also led to disapproving reactions. Especially if there was no present interest among inhabitants in retrofitting the dwelling, or in inserting alternative housing types and functions in

78. Simon John Bowen, "A Critical Artefact Methodology: Using Provocative Conceptual Designs to Foster Human-centred Innovation" (PhD thesis, Sheffield Hallam University, 2009).

79. Bowen, "A Critical Artefact Methodology", 34.

the neighbourhood, inhabitants clearly expressed their arguments against the three strategies. This allowed for the documentation of weak spots and risks of these strategies, and also demonstrated the *obduracy*[80] of spatial configurations. Where a social constructivist perspective would hold on to a descriptive stance, the ambition to contribute to a project of transition, requires the involvement of additional theoretical perspectives. The discussion of strategies with inhabitants can therefore also be seen as a process of creating awareness. The influential social theorist David Harvey explains how changing one's perception of the world is like a "chicken-and-egg problem" of determining what comes first: either the world (construed out of diverse societal dimensions) changes first, and the individual adapts; or an individual's perception of the world (the individual being a socially constructed entity) changes first, which incites the individual to change the world.[81] In the case of this project, the interaction with inhabitants and professionals directly resulted in awareness; these actors were confronted with the problem field of the low-density residential environment, and the researchers took an active role intervening in social reality.

The architectural viewpoint of this research allows to contribute to this perspective an analysis of the built environment in itself, in order to determine what transformations could be possible: here, the author acts as an "insurgent architect"[82] in trying to uncover such possibilities which could facilitate transformation. This is elaborated in chapter four. It proposes a complementary perspective as it analyses the sample of 65 detached dwellings inhabited by the respondents which were documented during field work. It reports of a search for constants in the diverse stock of Flemish detached dwellings, in order to determine to what level strategies aiming for subdivision could be implemented in a feasible way. By isolating and abstracting reoccurring building configurations, it proposes a *generic* perspective on potential design strategies, which emerge as a result of typological analysis based on processes of abstraction and generic modelling as done by scientists and designers alike.[83]

80. Anique Hommels, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT press, 2005).

81. David Harvey, "The Insurgent Architect at Work," in *Readings in the Philosophy of Technology*, ed. by David M. Kaplan (Lanham: Rowman & Littlefield Publishers, inc., 2004): 341.

82. Harvey, "the Insurgent Architect at Work".

83. Femi Dogan, and Nancy J. Nersessian, "Generic abstraction in design creativity: the case of Staatsgalerie by James Stirling," *Design Studies* 31, no. 3 (2010): 207-236.

It complements the social constructivist perspective, by means of a detailed reading of reoccurring building patterns, which now are used equally to house single households. The analysis proposes an alternative reading of intricacies and details which provide the possibility of other forms of usage (such as shared inhabitation) in the future. In doing so, the dissertation follows the argument of philosopher Andrew Feenberg, who, seeking to mediate between the perspective of philosophy of technology and the social-scientific perspective, argues that both an understanding of the properties of a given technological system and its meaning in a societal context are necessary.[84] In this case, the documented dwellings of the respondents provided a detailed data set, which resulted in a focus on the scale level of the dwelling in this chapter of the thesis in particular.

These studies of the viewpoints of home owners and of the buildings they inhabit brought this research to a level, where the involvement of professional perspectives became essential in advancing the work. In chapter five, the social constructivist perspective is retaken: the chapter reports of interviews with architects, planners, civil servants and real estate agents, again with the three developmental strategies as a central topic. Their professional background allowed or a more profound discussion of these strategies, and additional, detailed aspects of the transformative schemes were incorporated into these discussions (**figures 27-29**). In order to frame the diverging professional positions with regard to transformation of the residential environment, this chapter deepens theory related to obduracy of the built environment, and also concepts of transition management, in order to be able to relate concrete issues on the level of existing built situations to developments on the level of professional societies.[85] This chapter provides an elaborated insight into why resistance to transformation is strong, and in operational modes of overcoming such resistance.

84. Andrew Feenberg, "From Essentialism to Constructivism: Philosophy of Technology at the Crossroads," in *Technology and the Good Life?*, ed. by Eric Higgs, Andrew Light and David Strong (Chicago: the University of Chicago Press, 2000): 294-315.

85. These two concepts are explained respectively in Anique Hommels, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT press, 2005) and in Jan Rotmans, *Transitiemanagement; sleutel voor een duurzame samenleving* (Assen: Koninklijke Van Gorcum, 2003). The interaction and differences between these two disciplinary viewpoints will be further elaborated in chapter five.

As a final exploration before drawing up the conclusion, chapter six involves the results of *particular* design processes. This is not based on design production of the author, but on the results of a workshop organised for students of interior architecture and architecture.[86] Elaborating on the theory of scenario building, design development was framed within the context of the overarching research project, while leaving the designers enough freedom to explore specific design trajectories. The participants were asked to develop a concept for sharing a dwelling between two households, and as such have developed narratives which detail the role of the detached dwellings in the overarching strategies. This chapter acknowledges the assumption that qualitative design can only be achieved when it is embedded in a specific context and clear project brief. While the main output for participating designers was their design result, in the context of this research, these results are analysed with incorporation of the argumentation throughout the search for proper scenarios and appropriate narratives for these scenarios.

Such practice of scenario building can build on a tradition of balancing creative, design-based work with more rigorous scientific work. In futures studies, scenario building is a widely debated issue, since many approaches coexist, and several authors have attempted to propose a typology system aiming to frame the diverse forms of scenarios. In the context of this thesis, the typology of environmental researchers Lena Börjeson et al. is followed. [87] In their user-focused categorisation, three scenario types based on three kinds of questions are proposed, which scenario users could possibly want to address by studying the future: the question *What will happen?* is best answered with a predictive scenario, which facilitates planning for situations which are almost sure to occur. In contrast, *What can happen?* is a question typical for an explorative scenario, which enquires into situations which possibly could occur. Lastly, *How can a specific target be reached?* is a question typical of a normative scenario, which hence sets a defined goal

86. Workshop organized at the PHL University College, in cooperation with professor Koenraad Van Cleempoel, 18 February – 1 March, 2013. A precursor of this chapter was presented at the Knowing (by) Designing conference at the KU Leuven Faculty of Architecture. See Marijn van de Weijer, and Oswald Devisch, "Towards an Ideal Scenario: Two attempts to integrate arts and science to address spatial issues", in *Proceedings of the Knowing (by) Designing Conference*, ed. by Johan Verbeke and Burak Pak (Brussels: LUCA, Sint-Lucas School of Architecture Ghent/ Brussels, KU Leuven Faculty of Architecture, 2013): 300-311.

87. Lena Börjeson, Mattias Höjer, Karl-Henrik Dreborg, Tomas Ekvall, and Göran Finnveden, "Scenario types and techniques: towards a user's guide," *Futures* 38, no. 7 (2006): 723-739.

and illustrates which steps need to be taken so that the goal may be realised the future. The approach elaborated in chapter six, on a general level enquires *how* the housing stock can develop towards a better fit with demographical, socio-cultural and environmental conditions, by means of devising a concrete project brief, for a specific dwelling, and furnishing this by means of design proposals. The involvement of an architectural viewpoint, a design discipline which defines and develops a project brief, effects a labelling as a normative approach to scenario building, as it lays out plausible situations for small-scale transformations.

Disciplinary positioning

The approach of the research project, which was formulated as a practice-based search for design strategies to re-use existing, large dwellings, might be read as an intrinsic bias, which was further coloured by the author's background as an architect. As is explained in chapter two, design practice always involves experience, tacit decisions and heuristics focused on problem solving, but which resist strict rationalisation and verification as would be required by scientific practice. The involvement of design practice in a research project also entails that value systems inherent to architectural practice are introduced into the academic context. To complete this introduction, this last section will therefore frame the disciplinary positioning of the author vis-à-vis Flemish residential architecture and the detached dwelling.

During his career as a practicing architect predating the doctoral research, the author was mainly involved in early design phases (competitions, preliminary and definitive design stages) of architectural projects. The instruments of design which are involved by the author throughout this dissertation are mainly derived from such early stages in the design process, and especially involve sketching and hand drawings. The cognitive scientist Vinod Goel characterised the early phases of design as "a process of creative, ill-structured problem solving, in which generating

and exploring alternatives is facilitated through a coarseness of detail, a low commitment to ideas, and a large number of lateral transformations".[88] Sketching takes in an important role in this stage as it can be seen as a symbol system, in which information is densely and selectively packed, and represented in an ambiguous way.[89] Because of this ambiguity, sketches not only serve designers as a medium for testing or elaborating their concepts, they also trigger a process of reinterpretation as their producers review these drawings, leading to the emergence of new ideas and insights in the following stages of the design progression.[90] Following the concept of creativity as explained by the architect and design methodology researcher Bryan Lawson, stating that "creativity depends upon being able to see the same thing or idea in several different ways, the ability to generate a variety of perspectives".[91] This openness was a reason to involve such design instruments, especially during discussions with respondents. It allowed inhabitants to reflect on the proposed scenarios without feeling the threat of a concrete plan which would have impact on their direct environment. In the discussion with professional designers, it allowed these respondents to bring in their own concepts, and relate these to the images up for discussion. Their associative thinking in response to sketched scenarios (as well as their critiques on this approach) has brought additional details and concerns to the fore.

Not only professional bias, but also a cultural one needs mentioning, since the author is not a Belgian national. Trained as an architect in the Netherlands[92], he was prepared for working in a planning context which is quite different from the one in Flanders. One well-discussed difference is the strong role central government has traditionally taken in spatial planning. It is often argued, that the Dutch battle against the water required a strong central spatial planning apparatus, serving a common good, in contrast to the stronger emphasis on individual interests in Belgium.[93] The compact city notion has played a strong role in Dutch planning history,

88. Vinod Goel, *Sketches of thought*. ed. by Vinod Goel, *Bradford Books* (Cambridge: MIT Press, 1995).

89. Goel, *Sketches of Thought*, 179.

90. Alexandre Menezes, and Bryan Lawson, "How designers perceive sketches," *Design Studies* 27, no. 5 (2006): 571-585.

91. Bryan Lawson, *How Designers Think* (London: Architectural press, 1980).

92. The author graduated as an architect/engineer from Eindhoven University of Technology in 2005. Mentors: prof. ir. Ton Venhoeven, drs. Pieter Jan Gijsberts, and prof. dr. ir. Bruno De Meulder.

93. Andreas Faludi, "The Netherlands: A culture with a soft spot for planning," in *Comparative planning cultures*, ed. by Bishwapriya Sanyal (London: Routledge, 2005): 285-307.

although the latest spatial planning memorandum acknowledges rather the emergence of urban networks, beyond borders of cities and national frontiers.[94] Suburban residential zones in the Netherlands have manifested quite differently, as rather compact neighbourhoods attached to historical cores. The much-discussed Vinex neighbourhoods[95], like the Flemish suburbs, are criticised for their monotony and an imbalance with regard to typological variety, although the balance in the Dutch Vinex neighbourhoods leans towards terraced housing, not towards detached houses. The influence of this policy was strongly felt at the beginning of the author's career, as the results were extensively being published in professional magazines, and determined the architectural production and debate. Hence, also architectural production in the Netherlands differs significantly from Belgium, especially with regard to the building of housing.[96] Dutch architects, more than their Belgian colleagues, have a tradition of working on large commissions for developers or housing corporations, a system which has taken heavy blows in recent years as a result of the successive economic crises. Having studied and worked in this context, the author holds professional experience as a practicing architect working on large-scale projects in central urban locations, or as redevelopment proposals for brown field locations in cities (**figure 30**).

The author was furthermore strongly influenced by the discourse of the Dutch architectural elite of the turn of the millennium. Leading architects propagated the concepts of complexity, density, and bigness in their work and publications.[97] These concepts have been put forward as a logical consequence of operating in generic conditions, characteristic of sprawling or networked cities, and globalisation: Dutch architecture has been a strong export product, not just suited to operate in the context of the Dutch compact city. Hence, like often a comparison is drawn between the Netherlands and Belgium (or Flanders) in literature on planning and architecture, the author had Dutch experience as a touchstone

94. Wil Zonneveld, "In search of conceptual modernization: The new Dutch 'national spatial strategy'," *Journal of Housing and the Built Environment* 20, no. 4 (2005): 425-443.

95. Vinex (Vierde Nota Extra) neighbourhoods were planned between 1995 and 2005 under regulation of the fourth memorandum on spatial planning. See: Jelte Boeijenga, Jeroen Mensink, and Joost Grootens, *Vinex Atlas* (Rotterdam: 010 Publishers 2008).

96. Hilde Heynen, "Belgium and the Netherlands: two different ways of coping with the housing crisis, 1945-1970," *Home Cultures* 7, no. 2 (2010): 159-178.

97. See for example Koolhaas' manifesto for big buildings: Rem Koolhaas, "Bigness, or the problem of Large", in: Rem Koolhaas, and Bruce Mau, *S,M,L,XL* (Rotterdam: 010 Publishers, 1995).: 494-516.

during the research process. This has certainly influenced the taking of a critical position vis-à-vis the housing model of the detached dwelling characteristic of Flanders, since Flemish allotments and linear ribbon developments, while very complex in se, lack the thick functional layering and density of central cities.

98. Postgraduate Master of Human Settlements, ASRO department, KU Leuven, 2008-2009.

The switch-over from large-scale projects to the small scale detached dwellings as a consequence of engaging in the project at hand, also entailed a particular positioning towards aesthetics, small-scale architectural commissions, and architectural quality. The advanced master studies done in Leuven,[98] during which attention was given to conditions of dispersal and sprawl in the light of specific, local conditions, such as culture, history, and landscape, are therefore an essential addition to the professional experience of the author. The instruments available from Dutch working experience proved strange to the Flemish condition, and therefore urged the author to assume the role of an outsider, with an unbiased/critical gaze. The author's background was therefore not developed as a Dutch *export product*, but rather as a touchstone in the background, used for tacit evaluation of the Flemish built landscape and the responding scenario development. The reformulation of the research question during the initial phase of the process, led to an approach which aims to use design strategies to investigate the stated problem in a more neutral manner, but is still founded on the idea that the condition of sprawl in Flanders requires involvement of architecture and spatial planning to develop other modes of spatial production, in search of a more sustainable and attractive residential environment.

The dwellings studied throughout this dissertation, are usually built without inflated architectural pretensions. Dwellings which are closest to the conception of good architecture according to the author, are the examples displaying a localised modernism and a spatial layout adapted to the specific site and inhabitant; to give some examples, a modernist villa by the relatively unknown

architect Van Hoof, affiliated with the *Turnhout school* deserves mentioning (**figure 31**). This dwelling is composed of intersecting volumes, which articulate the interior spaces in a sculptural way. The primary living area is one continuous space, organised by a sliding door, a central fireplace, and a height difference. Large windows connect the interior to the backyard. The private sleeping quarters have smaller windows, and the staggered organisation articulates each room clearly. Another example (**figure 32**) is a house by architect Verbeurgt, which capitalises on the sloping landscape and the view on a picturesque small town and its church. The living spaces open up completely to this view, by means of sliding glass panels and a well-oriented terrace. The private bedrooms are organised in a volume which is turned to the street, and is more closed because the windows are placed right under the saddle roof. This volumetric layout organises an interesting *promenade architecturale* from the street into the heart of the house which is strengthened by the conception of a paved and stepped path up to the front door, positioned at the intersection of two main volumes, facing away from the driveway.

Such qualities determine the functioning of the building as a family residence, as well as a lasting quality of some suburban dwellings, while they do not facilitate other patterns of inhabitation per se. Such architectural preferences were therefore bracketed, as this dissertation proposes a different reading of common dwelling sub-typologies, built all across the Flemish region, and assess whether these dwellings have potential for continued re-use or transformation under changing conditions. A certain architectural quality puts some weight in the scale when evaluating the quality of a dwelling in the light of diverse conflictive viewpoints on the feasibility of transformative strategies. Still, ugly or beautiful, small or big, unique or like a dime in a dozen, all the scrutinized houses and neighbourhoods are equally tested against the critiques related to location-based and typological fitness, which require a distinct way of looking.

2

On the exchange between design and research: a foundation for a methodology involving architectural instruments

- This chapter is the manuscript for the following publication: Marijn van de Weijer, Koenraad Van Cleempoel, and Hilde Heynen, "Positioning Research and Design in Academia and Practice. a Contribution to a Continuing Debate," *Design Issues 30*, no. 2 (2014): 17-29.

- acknowledgements: This article has been written within the context of the research project, *Large Underused Dwellings in Flanders, Development of Architectural and Users Strategies in View of Demographic Trends and Ecological Constraints,* which is organized at KU Leuven and Hasselt University and is financed by the Research Foundation Flanders (FWO). The authors would like to thank Oswald Devisch for his comments on an earlier version.

 DOI: 10.1162/DESI_a_00259

- Contribution of first author: Manuscript. Van Cleempoel and Heynen advised about the structure of the argumentation and the selection of literature.

- The title has been adapted to fit this manuscript in the structure of this dissertation.

In order to explain the role design practice assumes throughout this dissertation, primarily an explanation of a viewpoint on research through design is required. In response to changing social, professional and academic parameters in recent decades, the discipline of architecture is seeking to develop an integral research culture. Many proponents argue that this proper knowledge production should be based on an approach which involves the disciplinary-specific activity of designing in concepts like research through design or, in other words, practice-based research. These concepts however are often seen as confusing and ambiguous notions, covering different modes of production. In order to clarify this confusion, this chapter, which is published as an article in Design Issues, aims at positioning research and design by making distinctions in modality and finality of diverse approaches of inquiry. It maps differences as well as possible alliances between the world of academia and the world of practice. Challenging the often ill-used opposition of research and design, this chapter proposes a constellation which interrelates hybrid modes of knowledge production relying on various combinations of research and design. As such, the foundation of the mixed methodology and interdisciplinarity of this dissertation is outlined: it results from the intention to connect diverging perspectives on a single problem, and to seek continuity by developing design as a central (but multiform) thread. The dissertation broadly explores approaches of relating research to design and vice versa. In doing so, it demonstrates an interpretation of design practice as a mode of production which assumes different roles according to the requirements of a research endeavour to reach certain progress. This requires certain exchangeability of scientific and design-based arguments between different modes of production.

The argument made in this article is illustrated by discussing two pathways of knowledge production, in which various versions of design/research combinations work together in a specific line of investigation. In the first pathway, design is used as an exploration of what is at the onset a very unclear, messy situation, in which practice-based research can help to identify a problem definition. In the second pathway, the design of innovative tools (such as prototypes, probes, mock-ups, scenarios or technical instruments) can be inscribed in a project defined as scientific, as a practical contribution to the formulation of questions, the gathering of data, or reflection on theories. These two pathways form hybrids on the design/research scale, not clearly belonging just to the one or the other. They are used as examples to illustrate how research in architecture can indeed encompass different modes of knowledge production, in which creative practice is of major importance.

Such interaction is implemented as a process of exchange between research and design throughout the thesis. Each one of the ensuing chapters is written as a specific contribution to answering the research questions stated in the introduction. Design takes in diverging roles in these chapters: it is used to structure communication with stakeholders about spatial adaptations, to analyse the possibility of transforming buildings, and to propose concrete proposals and narratives for these transformations. In the light of the transitional ambition to which this project adheres, the chosen approach facilitates that leaps are made at points of saturation typical of regular qualitative research.

Introduction

This article inquires into the uncertain positioning of research in the field of architecture as design discipline. No consensus exists on the nature of architectural research because multiple interpretations are used in practice, education, and academia. This contribution looks into this situation, trying to unlock the different logics that are at the base of these divergent interpretations and proposing a way forward. The paper looks for a theoretical framework to improve the exchange between different approaches to and modalities of research.

The notion that architectural practice has its own kind of knowledge production, relying on the capacity of designing, is often seen as a window of opportunity to outline the kind of knowledge that would be specific for architecture as a discipline. Thus, research *by* or *through* design has become a buzzword, used in professional, educational, and research environments.[1] This paper aims at understanding how this research by or through design should be positioned vis-à-vis other forms of research and other forms of design.

The interest in research as part of professional architectural practice can be linked to an ongoing redefinition of the professional identity of the discipline. Historically, architecture has had a close relationship with engineering, which has led to a continuous exchange of responsibilities with regard to "design-and-build" processes.[2] Still, architecture has primarily been the discipline that translates societal questions on how to live, dwell, and work in an environment in which human-made constructions and objects increasingly make up the scene of everyday life.[3] These issues have become increasingly complex in recent decades, which in turn has encouraged architects to define a part of their professional practice as research. Leading architectural offices have thus recently established a research branch, and have created a specific inquisitive profile for it, which distinguishes itself

1. Research *through* design as distinguished from research *into* or *for* design. This distinction has been discussed in a number of publications: Bruce Archer, "The Nature of Research," *Co-design, interdisciplinary journal of design*, no. January (1995): 6-13; Nigel Cross, "Editorial," *Design Studies* 16, no. 1 (1995): 2-3; Downton; Frayling; Ken Friedman, "Research into, by and for Design," *Journal of Visual Arts Practice* 7, no. 2 (2008): 153-160. See also, for a broad discussion of design knowledge, Imre Horváth, "A treatise on order in engineering design research," *Research in Engineering Design*, no. 15 (2004): 155-181.

2. Andrew Saint, *Architect and Engineer: A Study in Sibling Rivalry* (New Haven, London: Yale University Press, 2007).

3. Rosalind Williams, *Notes on the Underground* (Cambridge, London: The MIT Press, 1990).

from the traditional architectural profile defined by design and the finality of construction.[4] Meanwhile, architectural research in universities and other institutions continues to grow, because universities stimulate their architectural departments to undertake more research.

The increasing academic activity in this field came about for a number of reasons. In the United Kingdom, design and fine art since 1992 have been and are, being taught in an academic environment, after the polytechnics merged with the universities.[5] In continental Europe the Bologna process, calling for a more transparent and uniform system of higher learning, gave rise to a similar process, with former *Hochschulen* being transformed and integrated into an academic system; *Hochschulen* are thus expected to conduct research activities and to produce research output. This change raises questions about how to adequately measure "research output." University policy makers traditionally have developed systems to measure output based on indexes (e.g., ISI Citation). However, these methods fall short in measuring design output. Therefore, proponents of research through design suggested that a design or a design project could be considered substantive research if it is publicly disseminated and peer-reviewed by means of exhibitions, installations, or professional publications.[6] If so, it would affirm architecture's particular disciplinary identity and boundaries.[7] Frank van der Hoeven, in a recent article focusing on the position of the architecture faculty at the TU Delft, addresses the difficulty of how to assess architectural research in an academic climate, where research merit is gained with publication in a limited selection of peer-reviewed, scientific journals.[8] His proposal is to give more weight to the societal relevance designerly practice addresses, but with scientific rigor as a standard. As such, design would become a modus for academic inquiry linked with the societal role so commonly associated with the design practice.

4. Two leading Dutch offices serve as examples of this tendency: the Office of Metropolitan Architecture (OMA) has a counterpart in AMO (the name is actually an anagram or mirror image of OMA without a fixed meaning), and the Why Factory is a counterpart to MVRDV.

5. Michael A. R. Biggs, and Daniela Büchler, "Rigor and Practice-based Research," *Design Issues* 23, no. 3 (2007): 62-69

6. Archer, "The Nature of Research," 10; and Frayling, *Research in Art and Design*, 5.

7. Matthew Powers, "Towards a Discipline-Dependent Scholarship," *Journal of Architectural Education* 61, no. 1 (2007): 15-18; Chris Younès, "Doctorates Caught Between Disciplines and Projects," *The Journal of Architecture* 11, no. 3 (2006): 315-322.

8. Frank Van Der Hoeven, "Mind the evaluation gap: reviewing the assessment of architectural research in the Netherlands," *architectural research quarterly* 15, no. 2 (2011): 177-187.

This line of thinking brings us to the apparent tension between academic and professional aspects of the discipline. Traditionally, research in architectural departments in universities was done by adapting research methods from related disciplines—sociology, art history, or anthropology, for example. Groat and Wang distinguish the inquisitive methods of an architect and state that these methods would be difficult to fit into a conventional academic research method.[9] Academic practice is indeed seen by many designers and scholars as a mode of knowledge production that is very different from design practice. Hence, academic research in architecture (e.g., in architectural history) could be seen as research *about* architecture—research from the outside—rather than research *in* architecture—research from the inside.[10] Research through design was advocated as having the potential to close this gap, which exists between the theoretical world within academia and the hands-on, context focused everyday reality of the work in architectural offices.

9. Linda Groat, and David Wang, *Architectural research methods* (New York: John Wiley & Sons, 2002).

10. Hilde Heynen, "Unthinkable Doctorates? Introduction," *The Journal of Architecture* 11, no. 3 (2006): 277-282.

11. For example, we can refer to the Layout series, which was published by the Creative Industries Fund—formerly, the Netherlands Architecture Fund.. This series was an irregularly appearing publication of design work, presented as research into complex spatial issues. See http://architectuurfonds.nl/nl/lay-out/ (accessed August 22, 2012).

Diverse Interpretations of Research Through Design

Research through design is often proposed as the (missing) link between architects and society, or between academics and practitioners (see **figure 33**). Despite the broad interest from practitioners, educators, and scholars, each with their own perspectives on the concept, the actual link has not yet been established. Nonetheless, in local professional contexts, the creative practice of architects—addressing a research question with a strong spatial component—is often presented as designerly research and produces interesting insights.[11] Many institutional bodies have also developed an interest in the potential capacity of research through design and have issued position papers or manifesto-like documents. Several national architectural organizations, for example, have expressed their views on the link between design and research in different national contexts. The memorandum of the Royal Institute of British Architects (RIBA) on architectural research states that the professional

and academic fields together offer a basis for "practice-based research" in such cases when the profession offers data on design processes that is analyzed within academia.[12] This approach links practice and research, assigning the designerly role to practice and the analytical role to the university. On the other hand, the American Institute of Architects (AIA) mentions design research as data collection by "design investigation and speculation, observation and reflection."[13] Finally, the Australian Institute for Architects closely links research in architecture to design production and dissemination through professional exhibitions, journals, and books. This institute defines architecture research straightforwardly, as a method or "a framework for understanding research that is undertaken using a design methodology."[14]

Similar interests are manifested by professional practices. Leading architectural practices use research to expand their portfolio beyond traditional design briefs. Alternatively, offices have also defined the explorations in their design assignments as research.[15] These positions can be illustrated in the attitudes of Maas Van Rijs De Vries (MVRDV) and of Alejandro Zaera-Polo, formerly of Foreign Office Architects. MVRDV starts from the collection of masses of data as a basis for design decision making,[16] whereas Zaera-Polo defines a produced body of work as project-based research.[17] The design product—whether an urban plan, a building design, or a facade system—takes on a role either as a means to synthesize and present the research, or as a full body of experiential knowledge of architecture.

In academic circles, a similar open attitude exists toward "research." In 2003, the Dutch Berlage Institute[18] formulated its PhD program as *progressive research*, which distinguishes itself from traditional research in academia that "often operates as an administrative inquisition paralyzing all of us practitioners" and results in research that "remains entrenched in bureaucratic codes of academic behavior, confining these researches to be details

12. Jeremy Till, *Architectural Research: Three Myths and One Model* (London: Royal Institute of British Architects (RIBA), 2008) <http://www.architecture.com/Files/RIBAProfessionalServices/ResearchAndDevelopment/WhatisArchitecturalResearch.pdf > [Accessed 07 November 2012].

13. American Institute of Architects Knowledge Resources Staff, *AIA Research Primer* (Washington, DC: American Institute of Architects, 2009) <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab081880.pdf > [Accessed 07 November 2012].

14. Australian Institute of Architects, *Understanding Research Excellence in Architecture*Australian Institute of Architects, National Education Committee, 2009) <http://www.architecture.com.au/policy/media/Understanding%20Research%20Excellence%20in%20Architecture.pdf > [Accessed 07 November 2012].

15. Halina Dunin-Woyseth, and Fredrik Nilsson, "Building (Trans)Disciplinary Architectural Research - Introducing Mode 1 and Mode 2 to Design Practitioners," in *Transdisciplinary Knowledge Production in Architecture and Urbanism*, ed. by Nel Janssens and Isabelle Doucet (Dordrecht: Springer, 2011): 79-96.

[i.e. trivial] or even redundant with regard to the greater problems of discourse on Architecture, Urbanism, the City and Theory."[19] This *progressive research* approach is based on literature study, case studies, and finally the formulation of a set of architectural instruments to deal with contemporary social conditions—a toolbox. Design as such can come to the fore as a conclusive product. Alternatively, the European Association for Architectural Education (EAAE) describes a more modest role for design in a research context. The EAAE Charter for Architectural Research defines research by design as broadly as "any kind of inquiry in which design is a substantial part of the research process."[20] Design is thus termed a pathway to new knowledge, and as such, it is adopted as a methodology rather than a conclusive result.

That a search has been undertaken for a close connection between design practice and research practice is implicit, although the concept of research through design is not explicitly mentioned in all of these analyzed documents. Design—both in the definition as a mode of production and in the definition as a designed product—emerges either as a form of data, as a way to collect data, as a methodology, as a means of dissemination, or as a mode of synthesis. If we describe research activity as a process that functions according to a specific mode of production to achieve a specific finality, we can state that design is, in some viewpoints, a part of that mode and, in other viewpoints, a part of that finality.

Research through design is often proposed as the path to set apart architecture from other disciplines and to define a proper inquisitive mode. Rather than pointing toward a uniform concept—something research through design is often thought to be—this survey shows the ambiguity of the concept. Currently, this ambiguity creates confusion as to the question of what research through design in architecture actually *should* or *could* be. Research through design has become a double-edged sword, intended to shed light and clarity, but in the meanwhile equally

16. The designers explain their approach of extrapolating forms from research in the book, *FARMAX*. Winy Maas, Jacob van Rijs, and Richard Koek, *FARMAX: Excursions on Density* (Rotterdam: 010 Publishers, 1998, repr 2006).: 103. This approach is further discussed in Stan Allen, "Artificial Ecology," *Assemblage* 1997, no. 34 (1997): 107-109.

17. Alejandro Zaera-Polo, "Patterns, Fabrics, Prototypes, Tessellations," *Architectural Design* 79, no. 6 (2009): 18-27.

18. The Rotterdam-based Berlage Institute was an independent postgraduate institute for architectural training and research. In 2012, the institute lost its funding from the Dutch government and as such ceased to exist as an independent postgraduate institute. It continues as an institution within the TU Delft.

19. Wiel Arets, Pier Vittorio Aureli, Alexander d'Hooghe, and Roemer van Toorn, "The Properties of Projective Research," *Hunch*, no. 6/7 (2003): 526-527.

20. European Association for Architectural Education (EAAE), *Charter for Architectural Research, a Declaration and a Framework on Architectural Research* (Chania: European Association for Architectural Education (EAAE) Research Committee, 2012) <http://www.eaae.be/web_data/documents/research/120903EAAECharterArchitecturalResearch.pdf > [Accessed 07 November 2012].

producing confusion, as different modes of knowledge production are not always comparable or compatible.

Research vs. Design: Antithetical Concepts

A brief literature review reveals that many authors conceive of research and design as antithetical. In discussing the characteristics of scientific research on the one hand and/or of design on the other, these authors focus on the differences between both. Some of them situate these differences mostly in terms of modalities, others in terms of finalities of both approaches. See Table 2.1[21] for an overview.

21. The table is an elaboration based on the following references: Richard Buchanan, "Wicked Problems in Design Thinking," *Design Issues* 8, no. 2 (1992): 5-21; Nigel Cross, "Creative Cognition in Design I: The Creative Leap," in *Designerly Ways of Knowing*, ed. by Nigel Cross (London: Springer-Verlag, 2006): 43-61; Nigel Cross, *Designerly Ways of Knowing* (London: Springer-Verlag, 2006); Nigel Cross, "Designerly Ways of Knowing: Design Discipline versus Design Science," *Design Issues* 17, no. 3, summer (2001): 49-55;

Table 2.1:antitheses between professional and academic practice

	Academic practice (scientific research)	**Professional practice (design)**	**Sources (full references: see note 21)**
Mode of production	Objectivity, how things are, exchangeable facts	Subjectivity, how things ought to be, personal choices	Darke 1979, Simon 1969, Cross 2006
	Explicit knowledge as a basis	Tacit knowledge as a basis	Polanyi 1983, Schön 1983
	Analysis, rationality	Synthesis, mimesis	Cross 2006, Powers 2007, Heynen 1999
Finality	Convergence towards paradigms	Convergence towards application of paradigms in divergent situations	Schein 1973
	Problem defining	Problem solving	Gregory 1966, Cross 2001
	Applies to a general, representative concept	Applies to a single, particular case	Buchanan 1992, Powers 2007

Most commonly, standards of good research are deemed to include a systematic process, rigor, transparency, communicability, repeatability, validity, and originality.[22] Adherence to these principles determines whether a form of knowledge production is inside or outside a scientific paradigm. Design activities, on the other hand, are evaluated according to other principles, which are harder to generalize because they depend on the project brief, the scale, contemporary professional norms, the client, and other factors. These activities are characterized by subjective, decisive key moments that exemplify the importance of tacit knowledge in making rapid progress working on a complex project: These moments have been termed "the creative leap"[23] by Cross or the "primary generator"[24] by Darke. Tacit knowledge—the knowledge that allows us to make choices on a daily basis without explicitly stated reasons and procedures—has been explained by Donald Schön as the basis for professional decision making, especially in the case of designers.[25] Here emerges the opposition with the explicit knowledge of the scientist.[26]

Many authors also distinguish between research and design on the basis of the finality of both. Research, then, is supposed to give rise, on the basis of specific empirical findings, to theories that are of general validity; hence, it converges toward paradigms. Design, on the other hand, is most seen as a specific answer to a specific problem; hence, it is not apt for generalization and abstraction. In the same vein, science would lead to a correct definition of problems (think, for example, of the problem of climate change), whereas design is rather geared toward problem solving.

From an Antithesis to a Continuum

Of course, among the authors discussing these differentiations, there are quite a few who are arguing in favor of a rapprochement between research and design. Nigel Cross, for example, argues that designerly paradigms have been susceptible to influence from the mode of research because avant-garde architects saw

Jane Darke, "The Primary Generator and the Design Process," *Design Studies* 1, no. 1 (1979): 36-44; S.A. Gregory, "Design and the Design Method," in *The Design Method*, ed. by S.A. Gregory (London: Butterworths, 1966): 3-10; Hilde Heynen, *Architecture and modernity: a critique* (Cambridge: MIT Press, 1999); Michael Polanyi, *The Tacit Dimension* (Gloucester: Peter Smith, 1983); Donald A. Schön, *The Reflective Practitioner, How Professionals Think in Action* (Aldershot: Ashgate Publishing Limited, 1983); Herbert Simon, *The Sciences of the Artificial* (Cambridge, Ma: MIT Press, 1969); Powers, "Towards a Discipline-Dependent Scholarship"; and Donald A. Schön, *The Reflective Practitioner*, 45-46, quoting Edgar Schein, *Professional Education* (New York: McGraw-Hill, 1973).

22. Archer, "The Nature of Research": 6; Cross, "Editorial": 2–3; and David Durling, "Discourses on research and the PhD in Design," *Quality Assurance in Education* 10, no. 2 (2002): 79-85.

23. Cross, "Creative Cognition in Design I": 43–61.

24. Darke, "The Primary Generator and the Design Process": 36–44.

25. Schön, *The Reflective Practitioner.*

26. Heynen, *Architecture and Modernity*, referring to Theodor Adorno, *Aesthetische Theorie* (Frankfurt am Main: Suhrkamp, 1970).

themselves as rational "scientists" designing the future.[27] Michael Polanyi posits that science relies as much on soft skills based in tacit knowledge as on explicit, "hard" knowledge.[28] We take this rapprochement still one step further, exploring how research and design can be brought together in a productive, investigative practice as a valid form of scientific practice.[29]

A number of conceptual models, built on arguments aiming to surpass the strict delineation between scientific research and creative practice, are relevant to overcome the antitheses outlined. Gibbons et al. explain a complementary type of knowledge, which manifests as a "second mode of knowledge production" next to traditional scientific knowledge production and is "created in broader, transdisciplinary social and economic contexts"; they term this approach *mode-2*.[30] Design disciplines have adopted this model because it allows the placement of design practices side by side with scientific research. Biggs and Büchler explain this relation in terms of a *spectrum*, with two extreme poles: "[1] exploratory practice within the traditional model of academic research and [2] practice as a generator of relevant questions that are explored within the structure provided by the traditional model of academic research ...."[31] Dunin-Woyseth and Nilsson build further on the concept of mode-2 knowledge,[32] arguing for a transdisciplinary knowledge production that involves academic researchers, professional practitioners, and other stakeholders in society. They represent their view on hybrid forms of knowledge production in graphical terms by means of a field, divided by a horizontal axis that runs between *scientific research* and *creative practice,* comparable to the spectrum of Biggs and Büchler, and a vertical axis that runs between *disciplinarity* and *transdisciplinarity*. These models describe how design practice can be involved in scientific research practice, and how several approaches can be placed next to one another in a continuum.

By proposing a more elaborate model (see **figure 34**), we want

27. Cross, "Designerly Ways of Knowing," 49.

28. Polanyi, *The Tacit Dimension,* 20.

29. Jonathan Hill, "Drawing Research," *The Journal of Architecture* 11, no. 3 (2006): 329-333.

30. Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzmann, Peter Scott, and Martin Trow, *The New Production of Knowledge, The Dynamics of Science and Research in Contemporary Societies* (London: Sage Publications, 1994, repr 2002).

31. Michael A. R. Biggs, and Daniela Büchler, "Architectural Practice and Academic Research," *Nordic Journal of Architectural Research* 20, no. 1 (2008): 83-94 (87).

32. Dunin-Woyseth and Nilsson, "Building (Trans)Disciplinary Architectural Research": 79–96.

to clarify how different practices of research and design can be mapped in relation to one another. We propose a constellation subdivided by two axes: the mode of knowledge production forms the vertical axis, finality makes up the horizontal one. The vertical axis indicates how a specific practice is situated between "rationality" (analysis, objectivity, calculation) and "mimesis" (synthesis, subjectivity, imaging); the horizontal one maps whether a specific praxis is geared toward specific solutions for specific problems (problem solving) or, rather, toward general theories and abstract understandings that allow for the correct posing of the problem (problem defining). Various combinatory practices, with different finalities and approaches, can be positioned along this continuum. On the side of "mimesis" and "problem solving," one finds professional architectural design practices, where architects answer specific briefs with designs for specific buildings. Moving downward, one finds engineering practices, which also offer specific solutions for specific problems but on the basis of calculation and analysis rather than on mimetic ways of knowing. At the other side of the vertical axis, one would find in the lower quarter the sciences and the social sciences—both based on analytical and objectifying modes of knowledge, both addressing general issues and generating correct and generally valid problem definitions rather than unique solutions. In the upper left quarter, lastly, we situate "research through design"—exploratory research that relies on mimetic ways of knowing, but at the same time is generalizing and abstracting rather than specific.

We now discuss in greater detail two interpretations of research through design to test the validity of this model as a way of elucidating possible relations between different practices of investigation.

Exploring Possibilities By Means of Design

Because architectural design is local and context-bound, so is an acclaimed version of research through design. In the Low Countries,

the context of the authors, the term "designerly research" is used by designers who engage in complex spatial transformation processes, in which many different actors are involved, requiring (re)design in order to visualize and test different scenarios with possibilities for future spatial developments. Loeckx states that "[w]e take this research by design to mean: an exploration of the spatial possibilities and limitations of the site; 'mapping' the spatial sensibilities, interests, agendas, and skills of various urban stakeholders; [and] exploring the spatial convergences that could suggest new forms of collaboration and open up new trajectories of development."[33] The image of the researcher that emerges from this description is one of a designer collecting and interpreting data in a critical, mimetic way.

This approach builds on a tradition of inquisitive practice, performed by designers and resulting in an explication of local qualities, limitations, and contestations by means of a design proposal.[34] Italian urbanists and academics Viganò and Secchi similarly explain knowledge obtained by designing as a precise, descriptive account that includes in the fullest detail all aspects of a given site.[35] The emphasis these authors put on the designerly perspective urges a comparison with a mode of production characterized by a synthesizing effort the designer makes to address a complex spatial issue by building both on experience and on judgment as to how "things ought to be." Although this approach sees *research practice* as an inquiry into what actual design commission can be derived from a social and spatial situation, the ways to arrive at a conclusion and the products that are disseminated are closely related to *design practice*. However, this approach distinguishes itself from pure "regular design" in its finality, by explicitly taking on problem definition as a part of its objectives. The designers aim to develop sustainable and equitable ways to use space, but the designerly endeavor does this by proposing a project that offers clear insight into the nature of the spatial issue. As such, direct application (by means of building

33. André Loeckx, "Project and Design, Amending the Project Mode," in *Framing Urban Renewal in Flanders*, ed. by André Loeckx (Amsterdam: SUN Architecture Publishers, 2009): 25.

34. André Loeckx, and Kelly Shannon, "Qualifying Urban Space," in *Urban Trialogues, visions_projects_co-productions, Localising Agenda 21*, ed. by André Loeckx, Kelly Shannon, Rafael Tuts and Han Verschure (Nairobi: UN-HABITAT, PGCHS KU Leuven, 2004): 156-166. These authors explain this approach as a strategic project, which contrasts with the all-encompassing design of a traditional master plan.

35. Paola Viganò, and Bernardo Secchi, "Some Reflections on Projects and Design," in *Strategic Spatial Projects, Catalysts for Change*, ed. by Stijn Oosterlynck, Jef Van den Broeck, Louis Albrechts, Frank Moulaert and Ann Verhetsel (London: Routledge, 2011): 154-160.

the plan) is not essential. The project is intended to offer new readings or conceptual frameworks for further elaboration. With regard to the finality, the balance struck does not lean completely toward academic practice: The locality remains essential, and the scope of this type of production does not aim for the formulation of general, representative concepts to be applied in other contexts.

Design as a Partial Methodology

Designerly activities alternatively can serve to develop instruments of inquiry or data collection, thus contributing to a research project that remains closer to the scientific mode of production. We explain this approach to research in abstract terms. Whereas the previous category had a clear focus on inquiring into specific, spatial situations, the current category is suited to the formulation of general concepts about spatial matters. Mottram and Rust acknowledge this category, and describe a role for creative practice as an instrument rather than a complete methodology. Practice provides "a location or focus [i.e. an applied process to be studied in a scientific context] upon which to direct questions,(...) a means of generating data, a site for testing propositions, for engaging individuals and communities, or for reflecting on theories and methods."[36] With regard to architecture, we can therefore assume that designing and developing research instruments in this research category remains limited to the production of representational models—either two- or three-dimensional, mock-ups or prototypes—because the full realization of a space, building, or site is extremely complex and time consuming, and would not fit in the timeframe and focus of a research, such as done during a PhD project for example.[37] Hence, we profile this type of "designerly researcher" as one who is able to redirect the design effort toward goals alternative to the traditional job description of the architect.

Within the mode of this approach, creative practice is bound by scientific rules and regulations. The practitioner has to balance the application of both creative and scientific activities, which

36. Judith Mottram, and Chris Rust, "The pedestal and the pendulum: fine art practice, research and doctorates," *Journal of Visual arts Practice* 7, no. 2 (2008): 135.

37. The authors can refer to the project, "Large Dwellings in Flanders," in which they are involved. This research project inquires into the large part of the Flemish housing stock that consists of detached, single-family dwellings, in the face of a changing housing demand because of demographic developments. In this project, design drawings, representing development scenarios, are used in interviews to collect qualitative data from diverse stakeholders, such as home owners, real estate agents, architects, and government officials.

again implies an alternative and more modest role for creative practice. David Durling claims that practical contributions might be incorporated "as a method for collecting data systematically or as a means to allow structured reflection upon practice," and he projects this perspective specifically on the pursuit of a PhD.[38] Rust further argues that designers can perform a role paralleled to scientific creativity and that occurs between the origin of a project and the drawing of conclusions.[39] Because a gap arises between existing knowledge and newly drawn conclusions, design thinking can be used to bridge this gap by proposing experimental models or objects to add to the methods of science. Hence, the designerly attitude enables leaps that are appreciated and accepted as "black boxes" and that facilitate a research process further structured according to the condition of systematic inquiry. This process involves the articulation of well-defined research questions, as well as dissemination of results according to the rules of science, meaning that the designed work is not the main output of the research.

As such, the potential results of this approach remain very close to the concepts of academic practice. Design produces an application and solves problems. These applications are not part of the finality but instead facilitate the scientific process. Although the finality remains within the boundaries of scientific production, the mode of production involves designerly practice. To illustrate such a project type with a mode of production that strongly depends on creative practice, we refer to participatory action research (PAR). Henry Sanoff describes this research approach as a way to work with communities to generate knowledge about problematic issues existing in their social or spatial situations, but also to stimulate consciousness and initiative in all participants with regard to these issues.[40] He goes further to describe PAR as a sphere of participatory design and as "a family of research methodologies, which pursue change and understanding at the same time."[41] Within this approach, data collection is characterized by the

38. Durling, "Discourses on Research and the Phd in Design": 82.

39. Chris Rust, "Design Enquiry: Tacit knowledge and invention in science," *Design Issues* 20, no. 4 (2004): 76-85.

40. Henry Sanoff, "Editorial, special issue on participatory design," *Design Studies* 28, no. 3 (2007): 213-215.

41. Sanoff, "Editorial": 214.

personal choices, tacit knowledge, and mimetic capacity of its participants, while the scientist both participates and analyzes from a close perspective. Creative output as such obtains a double function, catering both to the everyday environment and to the academic world.

Discussion: Exploring the Continuum

Although other projects combining parameters of research and design can be imagined,[42] the described approaches serve as examples to elaborate the continuum proposed earlier. This continuum is shown in **figure 35**. Both approaches discussed are placed within the sphere of research through design, but they take different positions, with a proper balance between problem solving and defining, as well as between mimesis and rationality. Both occupy a precise point in the continuum but relate to a larger research context, in which different kinds of projects can inquire into similar problems, although with another balance of mode of production and finality. This transferability allows for transdisciplinary interaction: The first approach (exploring possibilities by means of design) takes methods from architectural practice and feeds this sphere with innovative concepts. The second approach (design as a partial methodology) builds on theory and questions from the sciences and the social sciences, and provides this sphere with instruments to be used in research. Two different research contexts can meet at an intersection. This space illustrates that diverse projects can be tackled with similar methodologies and finalities. This opportunity is specifically important for architectural design in a research context. It allows us to think of design as a process with a potential to pursue multiple goals and to produce output for practice-based and academic audiences, combining both context-bound and generic conclusions.

The precise positioning of the two discussed approaches in the continuum brings with it a number of challenges and opportunities. Primarily, the elaboration of this continuum between design and

42. The design studio, taught by architecture faculties, is often seen as the common ground between research and design. A number of articles in the September 2007 issue of the *Journal of Architectural Education* discuss this combination of research and design in the studio, including David Hinson, "Design as Research, learning from doing in the Design-Build studio," *Journal of Architectural Education* 61, no. 1 (2007): 23-26; Kazys Varnelis, "Is there Research in the Studio?," *Journal of Architectural Education* 61, no. 1, September (2007): 11-14.

research facilitates the coexistence of diverse roles for creative practice in relation to research. Design can be the *finality* of a creative mode of practice and, alternatively, an instrument in a scientific *mode* of practice. Both approaches illustrate that design practice produces both innovative models and inquisitive instruments, depending on the research context. Clearly, these different roles for design involve differing criteria of quality and comparison. An alternative view on design practice could allow for the parallel exchange proposed as a basis for the development of research through design. This view has been advocated by Nigel Cross in terms of the "designerly ways of knowing," explaining the intrinsic values designerly knowledge has.[43]

Furthermore, what emerges from this analysis is that the outlined processes of knowledge production do not deliver unequivocal products; rather, knowledge is produced in both tacit and explicit form and is formulated both as general concepts and as particular answers to specific local questions. For example, if an inquisitive instrument is produced to inquire into a stated problem, it also produces methodological knowledge on another level—how to design, produce, and apply such an instrument. We can thus state that in the continuum, different modes of production can be arranged next to one another. However, to bring forward a stronger disciplinary identity, we need to figure out how the different production processes relate to each other. First steps have been to make explicit the distinction between different modes of production and to identify toward what kind of finality they are directed.

These steps can lead to an improved communication between related projects of both research and design, allowing them to be read as iterative steps in an ongoing process of knowledge production. Single design processes have been described by Takeda et al. to consist of such iterative steps, working from an ideal description of the solution to the actual solution.[44] Our

43. Nigel Cross refers to designerly ways of knowing (or technology as the "habitat" of the designer) as a third culture—and a pillar for general education—next to the ways of knowing in the sciences and the humanities. Nigel Cross, "Designerly Ways of Knowing," *Design Studies* 3, no. 4 (1982): 221-227.

44. Hideaki Takeda, Paul Veerkamp, Tomiyama Tetsuo, and Hiroyuki Yoshikawa, "Modeling Design Processes," *AI Magazine* 11, no. 4 (1990): 37-48.

analysis of two approaches to research through design shows that architectural design processes do not start with an idea of what the solution should be, nor do they necessarily deliver a final answer. Rather, design practice is used in both approaches as an advancement toward inquiry into a complex problem, which can be further elaborated in follow-up research efforts, shifting from a designerly to an academic mode of production and vice versa. Strict separation between the fields of practice and academia within the domain of architecture restricts such exchanges of shared concepts. The discipline would benefit from modes of production that include iterative steps between professional and scientific practice. To allow for such an exchange, awareness is required of how and where each effort of research through design is positioned in this field, and how the approach relates to comparable projects of research.

Finally, different approaches relate to different kinds of audiences. The first approach, focusing on the exploration of possibilities by means of design, produces spatial propositions that are taken as paradigmatic concepts for further professional elaboration and societal discussion. As such, it allows the practitioner to develop a perspective that remains close to the professional profile prevailing in the discipline. The second approach intends to formulate design as a partial methodology. It generates a profile of a practitioner who is able to develop design skills that facilitate communication with representatives of other scientific disciplines. To do so, he or she has to let go of a number of architectural traits typical of architectural practice. This difference underlines the statement Van Der Hoeven has made, asserting that architects who aim to use scientifically appreciated publications as their platform of communication lose the audience of their disciplinary peers.[45]

45. Van Der Hoeven, "Mind the Evaluation Gap": 185.

Conclusion

We emphasize that the contribution of this paper lies in a clarification as to how existing approaches come together in a

design-based discipline such as architecture, which undergoes continuous redefinition in a rapidly developing world. Design practice is shown to be well appropriated as an instrument of research, suitable for inquiring into socio-spatial issues with a unique local application and for investigating issues of the built environment in a fundamental, general way. Design practice, we believe, is able to continuously deepen and enrich the gathered data because it can provoke and test emerging concepts. As such, it can be a strong asset for architecture to continuously redefine its position—both in society and in academia.

The reinterpretation we propose between classical oppositions of either *research practice* or *design practice* explain how *research through design* can be composed as a hybrid mode of production. Although we have explored the tentative model of a continuum between design and research practice by explaining two recurring examples of research through design as they unfold in real-world situations, this paper stimulates further experimentation with hybrid projects to advance the development of discipline-specific knowledge and its dissemination. Further exploration of different kinds of design practice inquiring into the built environment is required to shed light on the very diverse expectations that exist across the entire discipline of architecture. The inquiry into research through design is often concluded with a plea for unorthodoxy with regard to dissemination and evaluation. We formulate a similar plea that is, however, addressed inward to the architectural community—a plea for a similarly unorthodox perception of creative practice as a basis of the discipline.

3
Projecting transformative concepts on the residential environment: how inhabitants in four municipalities evaluate three strategies for conversion

- This chapter is the manuscript for the following accepted publication: Wouter Bervoets, Marijn van de Weijer, Dominique Vanneste, Lieve Vanderstraeten, Michael Ryckewaert, and Hilde Heynen, "Towards a sustainable transformation of the detached houses in peri-urban Flanders, Belgium," *the Journal of Urbanism: International Research on Placemaking and Urban Sustainability* (2014).

- Keywords: detached single family houses; underused dwellings; over housed people; transformative scenarios; public support analysis.

- Acknowledgements: This research was supported by grant#G.0599.10 from The Research Foundation Flanders (FWO) for the research project 'Large underused dwellings in Flanders. Development of architectural and users' strategies in view of demographic trends and ecological constraints' carried out at the KU Leuven and Hasselt University, headed by Professors Hilde Heynen, Koenraad Van Cleempoel, Dominique Vanneste and Michael Ryckewaert. We would like to thank Bieke Cattoor and Peter Aeschbacher, and four anonymous reviewers for their feedback.

 DOI: 10.1080/17549175.2014.909368

- Contribution of first authors: The manuscript was structured in an equal cooperation between Bervoets and van de Weijer. Van de Weijer focused on the development of design strategies and the analysis of responses, resulting in parameters for further development of these strategies. Section 4, (on the indicator of potential), the two tables (see appendix 1) and the geographical figures 38-40 were authored by Vanneste and Vanderstraeten within the geographical research track. Vanneste, Ryckewaert and Heynen advised about the formulation and structure of the argumentation and about literature.

- To fit the manuscript in the structure of this dissertation, the title and reference system have been adapted.

The housing stock in Flanders contains a significant share of detached dwellings in low density neighbourhoods, constructed in the post-war period for nuclear families. Recent demographical, economic and ecological developments however have induced a large demand for other housing types, and for other kinds of residential environments. The following chapter, a research article accepted for publication in the Journal of Urbanism, initiates the enquiry into the feasibility of adapting existing low-density neighbourhoods in response to emerging societal developments, in order to bring also this part of the housing stock in line with contemporary demands. The article is based upon an investigation among inhabitants of low-density residential neighbourhoods, into the feasibility of three development scenarios. It theorises that the presence of a certain NIMBY attitude, and an adversity to change among current residents, complicate any planning efforts that would bring about fundamentally different spatial patterns. The paper offers first of all an analysis of the existing residential patterns, focusing on the presence of underused housing. This analysis is supplemented with an indicator, developed by other project members as a part of the geographical track of the research project, of the potential for sustainable development for specific neighbourhoods, which is visualised on a map of Flanders.

The elaboration of these strategies, and the documentation of responses to the explained concepts, is the part where design thinking comes in. It contributes to the distillation and representation of relevant spatial strategies, related to distinct development scenarios. Three such strategies, inspired by literature and international examples, have been elaborated for discussion during 61 interviews with home owners in the 10 Flemish municipalities which were chosen as case study sites. These three strategies include firstly a careful transformation which keeps the image of residential pavilions on a single lot intact (reconfiguration); secondly a jump in scale leading to bigger lots, more diverse dwelling units and additional functions (replacement); and thirdly, a process of removing obsolete dwellings in favour of reinstating vacant land with natural and ecological values (removal).

This approach opens up a perspective, in which sensible drawings stimulate respondents to formulate a clear position with regard to these development strategies, and to discuss parameters indicating successful or failed implementation. These viewpoints of inhabitants indicate guidelines for customized solutions which capitalize on common or public interests, bringing into play an alliance of different tendencies. Equally, protest and resistance is documented as important information which needs to be taken into account in spatial planning. This primary step hence defines and visualises a first attempt at outlining approaches of transformation, and simultaneously tests these approaches with inhabitants.

1. Introduction

The Flemish landscape[1], characterised by a much dispersed settlement pattern or urban sprawl, is inextricably tied to a long standing anti-urban policy and an on-going promotion of private home-ownership.[2] Post-war housing construction occurred in such a way that the detached single family house has become the basic building block for Flemish suburban, peri-urban and semi-rural development; it has been built across the entire region. It is however common knowledge that this building typology and its low density residential settlements create a number of concerns.[3] The contemporary discourse on sustainability of residential environment lies at the basis of these concerns. Sustainability is a broadly interpreted concept, that is often dissected into different aspects; People, Planet and Profit[4] or Social, Environmental and Economical Sustainability.[5]

1. Flanders is the northern, Dutch speaking region of the federal state Belgium, and excludes the Brussels capital region. Flanders has a large governmental autonomy including spatial planning, urbanism and housing policies. This autonomy has gradually increased starting from the 1960s – meaning that up till that point in time, planning, urbanism and housing were regulated by the Belgian state, and not yet by the Flemish region.

2. Pascal De Decker, "Understanding housing sprawl: the case of Flanders, Belgium," *Environment and Planning A* 43, no. 7 (2011): 1634-1654.

3. Erling Holden, "Ecological footprints and sustainable urban form," *Journal of Housing and the Built Environment* 19, no. 1 (2004): 91-109; Hedvig Vestergaard, "Single family detached housing-A branch of paradise or a problem," in *Home ownership. Getting in, getting from, getting out. Part II - Housing and Urban Policy studies 30*, ed. by John Doling and Marja Elsinga (Amsterdam: IOS Press, 2006): 75-91.

4. John Elkington, *Cannibals with forks : the triple bottom line of 21st century business* (Oxford: Capstone, 1998).

5. Katie Williams, and Caroll Dair, "What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments," *Sustainable Development* 15, no. 3 (2007): 135-147.

Furthermore, the sustainable human settlement is interpreted in the form of diverse models, ranging from a compact, high density city to a self-reliant, productive region.[6]

In Flanders, the professional and societal debate on the existing suburban housing stock and future housing needs revolves around a number of interrelated topics that are part of this discourse on sustainability. According to the last projections, the population in the Flemish region will continue to grow and reach 6,6 million people in 2030; about 375.000 or 6% extra people in 20 years.[7] Taking into account the decrease in household sizes, the frictional vacancy and second homes, it is estimated that for 2030 there will be a need for 330.000 additional houses in the region.[8] Another concern is what kind of housing to provide, anticipating the expected demographical and economical change – such as ageing, a decreasing average household size and increasing housing costs. Finally, there is the question how to deal with environmental issues such as sprawl, loss of open space, excessive energy consumption and mobility problems that are inherent to the current housing stock and would get worse should the current housing model be continued as such.

This paper takes this search for sustainable housing in existing residential neighbourhoods consisting of detached dwellings (**figure 36**) as a central problem. Our research set out to investigate what kind of support and resistances would be found among home owners regarding possible transformations of their neighbourhood, which were presented with projective sketches and corresponding scenario descriptions involving political, social and economical developments. Three observations define the starting point. First, the everyday reality of the Flemish residential landscape, which developed as the result of a long-standing anti-urban policy, is rather inert and not very open to change. Second, there is no awareness yet in the public debate about the problematic character of the overstock of older detached dwellings, maladjusted to both

6. Peter Droege, "Beyond Sustainability: Architecture in the Renewable City," in *The SAGE Handbook of Architectural Theory*, ed. by C Greig Crysler, Stephen Cairns and Hilde Heynen (London: Sage, 2012): 590-601; Graham Haughton, "Developing sustainable urban development models," *Cities* 14, no. 4 (1997): 189-195.

7. Michael Ryckewaert, Pascal De Decker, Sien Winters, Brecht Vandekerckhove, Frank Vastmans, Marja Elsinga, and Kristof Heylen, *een woonmodel in transitie; Toekomstverkenning van het Vlaamse wonen* (Antwerpen, Apeldoorn: Garant, 2012).

8. Ryckewaert et al., *een woonmodel in transitie*, 11-13.

ageing residents and small households (Architecture Workroom Brussels 2012).[9] Third, there is a need for a better understanding of the applicability of concrete spatial concepts for adaptive re-use of low density residential neighbourhoods. To address these issues, this contribution combines quantitative and qualitative methods of analysis. It relies on the one hand on a statistical mapping of the presence of underused detached houses in Flanders and its further interpretation into an indicator for the potential for sustainable development of each neighbourhood, and on the other hand on a qualitative research among homeowners.[10]

9. Architecture Workroom Brussels, *Naar een visionaire woningbouw. Kansen en opgaven voor een trendbreuk in de Vlaamse woonproductie.* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2012).

10. 74.4% of the Flemish households are home owners. See Pascal De Decker, Michael Ryckewaert, Brecht Vandekerckhove, Ann Pisman, Frank Vastmans, and Marie Le Roy, *Ruimte voor Wonen, Trends en Uitdagingen* (Antwerpen, Apeldoorn: Garant, 2010), 22.

11. The latest population and housing census is from 2001. We thank the Federal Agency for Scientific Policy as to provide data through the valorisation of the results of the 'Atlas of Belgium' programme.

12. On the basis of a cluster analysis, 10 municipalities were selected with a high share of underused houses, taking into account the geographical spread over the region and the degree of urbanisation. The findings in this article are based upon the first results of fieldwork in 10 municipalities (Figure 4b): Overijse (1), Sint-Martens-Latem (2) and Aartselaar (3), part of the agglomeration of respectively Brussels, Ghent and Antwerp; Lubbeek (4) and Alken (5), located in the urban fringe of the regional cities of respectively Leuven and Hasselt; Keerbergen (6), Aalter (7) and Retie (8), located in the commuter zones of respectively Brussels, Ghent and Turnhout; and Lummen (9) and Wortegem-Petegem (10) located in a rural residential zone. In each of these municipalities, based on a cluster analysis at the neighbourhood level as well as on the morphology, neighbourhoods were selected for the fieldwork.

13. Our research into the public support for neighbourhood changes is part of a larger research project on the 'underuse' of the housing stock in suburban Flanders. Our respondents were found through delivering letters in the private mailboxes of all the houses in the selected neighbourhoods. Approximately 3% of the households were willing to participate in the research. In this way, 53 respondents were found supplemented with 8 respondents who were found through snowball sampling.

The actual analysis is preceded by a literature review, which informs the elaboration of the problem statement in terms of the characteristics of the Flemish residential environment (section 2), contrasted with the need for sustainable transformations of neighbourhoods (section 3). In this section, a number of hypotheses are introduced which are further developed in the subsequent sections. The next section (section 4) explains how the quantitative analysis, based upon statistical information of the latest census[11], translates into the construction of an indicator of potential, which might lead to differential planning strategies for different parts of the territory. In order to cross over from planning strategies to qualitative research with inhabitants, a number of transformative scenarios has been devised, informed by the international literature on sprawl and suburban landscapes (section 5). These scenarios were used in the fieldwork in 10 low-density neighbourhoods[12] consisting of 61 home-interviews[13] with 91 home owners of detached single family houses[14] (section 6). Our group of respondents consisted mainly of older, first-generation residents, whose children had left the parental home. Finally, the paper discusses the main findings of this explorative research, which are fourfold. Firstly, the conclusions address the attainability of three transformative solutions. Secondly, a sharpened view on the gap between spatial strategies and the inert, everyday reality of the built environment is presented. Thirdly, we propose a basis for finding an overarching interest with inhabitants of detached dwellings in transforming the residential environment. Finally, we evaluate the tentative indicator and explorative mapping as a touchstone for spatial transformations.

Between September 2010 and December 2012, we conducted 61 semi-structured in-depth interviews which varied in length between 44 and 152 minutes, with an average duration of 81 minutes. This article is based on 3 out of the 8 sections of our questionnaire; the transcriptions were imported and coded in NVIVO. During our 61 home-interviews we interviewed 91 people, 48 men and 43 women. The age varied between 31 and 87 years old, with an average of 64 years old. Because the research focus was on 'underused' housing, the younger generations of residents as a consequence are underrepresented in our respondent group. From the 91 respondents, 79 had Belgian nationality, 7 had Dutch nationality, 2 had British nationality, 2 had Austrian nationality and 1 had French nationality. The majority, 65 of 91 respondents, had followed post-secondary education. Our respondents had been living in their houses between 1 and 53 years, with an average of 28 years. From the 91 respondents, 55 were retired, 22 had a full time job, 9 a part-time job and 5 considered themselves to be a homemaker.

14. The plot surface owned by our respondents varied between 399 m² and 15363 m², with an average surface of 2086m²; the gross surface of the dwellings varied between 126 m² and 775 m², with an average surface of 369m² (N=59 as 2 visited houses could not be documented properly for a calculation of the surface). Of the 61 houses, 44 had been built by the current home owners, 16 were bought from the previous owner and 1 house was inherited. The age of the houses varied between 8 and 62 years old, with an average of 34 years old.

2. Characteristics of the Flemish residential environment

Especially since the Second World War, the single family dwelling accounted for the major part of project briefs for most Belgian architects.[15] The lot became the canvas on which families could realise their dream house, and they have done so in many variations (**figure 37**). As such the detached dwelling has become the most represented housing type, covering around 36% of the total housing stock in Flanders. Today, on average 40% (ca. 330.000 dwellings) of the detached single family houses are underused with extremes up to 80% in some municipalities. The underused, detached single family houses represent 15% of the total housing stock. Under usage is a concept defined by surface, the number of (bed)rooms, and the number of inhabitants, which occurs in multiple forms.[16] Houses may become underused after family members (for example, adult children) move out, but also houses in some instances are designed spaciously, and may be expected to be under used throughout their entire life cycle. Without passing a value judgment over individual housing situations, this article does address the specific Belgian condition, where houses are relatively big compared to European standards[17], and the housing market and residential mobility are rather static.[18] On a regional scale, this leads to spatial issues as a result of low-density settlement patterns. Table 1 (in appendix 1) illustrates that underused detached housing is not only a phenomenon in the urban fringe; such houses are spread across the territory (for the relation between underused dwellings and the degree of urbanisation see also **figure 38**). They are especially prevalent in rural areas, and in some commuter zones, which offer the low-density, 'green' environments that are associated with this housing type. Mapping[19] (**figure 39, above**) reveals that municipalities in the central part of the country have lower shares of detached housing because larger amounts of other types of housing (semi-detached single family housing, terraced housing and apartments) are linked to the more urbanised character of the area. Furthermore there is, for historical reasons, a clearly legible difference between the eastern part of the region and the

15. Hilde Heynen, "Belgium and the Netherlands: two different ways of coping with the housing crisis, 1945-1970," *Home Cultures* 7, no. 2 (2010): 159-178.

16. In line with international definitions for 'underused', we took the number of rooms and the number of bedrooms as an indicator while adding the surface of the living space (including living room, kitchen, bedrooms and home office; but excluding bathrooms, hallways, garages, basements and attics) and the size of the household. This resulted in a complex algorithm for classifying a dwelling as '(extremely) underused' if the house offers at least 1 (2) bedroom(s) per member of the household, while the number of rooms indicating under usage goes up with the size of the household. We also are taking into account that, for the same number of rooms and the same household size, a larger house is more likely to be underused than a smaller one. For example, a dwelling inhabited by a 2 persons' household is considered underused if they have 3 rooms or more at their disposal when living in a house with less than 125 m² of living space, lowering that to 2 rooms or more if the living space is larger than 125m². This takes into account special ways of living such as lofts versus subdivided dwellings with a large number of small rooms.

17. According to an analysis of Bartiaux et al. (2005) The Belgian house on average counts over 130 m², while in countries like Sweden, Finland, the Netherlands and the UK, this average lies between 70 and 80 m².

18. Bruno Meeus, and Pascal De Decker, "The dynamic of not moving in Flanders, Belgium," *Ruimte & Maatschappij* 4, no. 2 (2012): 1-24.

western part.[20] The share of underused detached housing, related to the total housing stock (**figure 39, below**) therefore shows a very similar pattern favouring the wide fringe of major and regional cities as well as more rural parts in eastern Flanders – characterized by recent demographic growth and strong international economic impulses – without completely excluding the western part.

The historical development of Flanders resulted in a very dense settlement pattern dating back to the Middle Ages. Over time, foreign powers have installed all kinds of governance, from military despotism, over administrative tutelage to limited self-government, which resulted in a dislike of any form of authority and a widespread individualism. The undesirability of a strong authority was translated into a weak government that left room for the pursuit of individual freedom.[21] Flemish construction practices are dominated by *laissez-faire* and encouragement of the private initiative, rather than by public regulation and intervention.[22] The Belgian housing model matured after 1945, when a massive suburbanisation trend occurred, but its roots lie in the evolving political economy of the 19th century, when Belgium became heavily industrialized[23], and even before that, since pre-industrial rural Flanders also was characterised by a fine-grained network of hamlets, villages and settlements.[24] The industrialization was accompanied with rapid urbanisation, made possible by a very dense railway network with low fares.[25]

19. All maps are designed according to the 'natural break' method; Brussels is not included since Brussels constitutes a separate region within the federal structure of Belgium.

20. These differences are linked with the history of the settlement system, which can be explained from differing pre-industrial and industrial assets and population dynamics of the sub-regions within the region of Flanders. See Dominique Vanneste, Isabelle Thomas, and Luc Goossens, "Woning en woonomgeving in België", (Brussels: FOD Economie, KMO, Middenstand en Energie, Algemene Directie Statistiek en Economische Informatie, 2007).

21. Pieter Uyttenhove, "The Belgian back room," *Archis*, no. 2 (1997): 8-15.

22. Bruno De Meulder, Jan Schreurs, Annabel Cock, and Bruno Notteboom, "Patching up the Belgian Urban Landscape," *OASE* no. 52, Consumption and Territory (1999): 78-113.

23. De Decker, "Understanding housing sprawl": 1638.

24. Dominique Vanneste, "Rural economy and indigence in mid-nineteenth-century Belgium," *Journal of Historical Geography* 23, no. 1 (1997): 3-15.

25. De Decker, "Understanding housing sprawl": 1638; De Meulder et al., "Patching up the Belgian Urban Landscape"; Greet De Block, and Janet Polasky, "Light railways and the rural–urban continuum: technology, space and society in late nineteenth-century Belgium," *Journal of Historical Geography* 37, no. 3 (2011): 312-328.

26. Dominique Vanneste, "Le logement et la différenciation sociale et résidentielle dans la ville pré-industrielle en Europe occidentale (XVIe-XVIIIe siècles)," *Espace, populations, sociétés* 4, no. 1 (1986): 125-136.

27. Geert Bekaert, and Francis Strauven, *Bouwen in België 1945-1970* (Brussels: Nationale Confederatie van het Bouwbedrijf, 1971).

28. The 1889 Housing Law installed the legal base for the financing of social loans, the construction of social purchase dwellings and tax exemptions for home owners. After the Second World War, the need for both new housing and a stimulation of the construction industry was met by the De Taeye Act in 1948, providing fiscal incentives for private home builders. See De Decker, "Understanding housing sprawl": 1654; Michael Ryckewaert, and Katrien Theunis, "Het Lelijkste Land, de mythe voorbij," *Stadsgeschiedenis* 1, no. 2 (2006): 148-168.

29. In 1935, The National Society for Small-scale Land Ownership was established; a social housing company which encouraged living in rural areas and provided a serious amount of newly built one-family homes on sizeable plots. See Sofie De Caigny, "Catholicism and the Domestic Sphere: Working-Class Women in Inter-War Flanders," *Home Cultures* 2, no. 1 (2005): 1-24; Fredie Floré, "Lessons in modern living: home design exhibitions in Belgium 1945–1958," *The journal of Architecture* 9, no. 4 (2004): 445-462.

30. Els De Vos, and Hilde Heynen, "Shaping Popular Taste. The Belgian Farmers' Association and the Fermette During the 1960s and 1970s," *Home Cultures* 04, no. 03 (2007): 237-259.

The Belgian model thus put private initiative of pragmatic home owners at the centre of housing policies, in contrast with modernist urban planning, which would rather imply top-down planning and large scale projects.[26]

This approach was reinforced after WWII[27], when housing laws[28] and societal organisations supported and promoted home ownership.[29] The focus on production of detached dwellings resulted in a wide variety of fashionable styles and outlooks of these houses – ranging from the invented tradition of the 'fermette', based on a farmhouse[30], over dwellings inspired by modernist aesthetics, to mass produced bungalows constructed by prefabrication.[31] Regardless of their outlook, however, they share typological characteristics in terms of scale and organization, as well as in the position of the dwellings on their plot. They thus all adhere to the dream image of living in a green, quiet and spacious environment.

Parallels have been drafted between the Flemish and the American housing model[32], but the swarm of post-war detached houses in Flanders has not amassed in large, uniform housing projects, like the Levittowns in New York, New Jersey and Pennsylvania. Instead, the new production landed in an already fine-grained landscape of small settlements. The construction industry developed on the basis of private initiative rather than large-scale social housing projects[33], and the single-family dwelling was constructed in allotments across the territory, with minimal links to existing urban or village centres[34], further contributing to an on-going fragmentation of the landscape and to the development of 'ribbons' along countryside routes. Cities thus developed into urban regions with functional rather than morphological ties between the urban agglomerations on the one hand and the fringes and commuter zones on the other hand, which explains the distinction between degrees of urbanisation made in **figure 38**.[35]

31. André Loeckx, "Wonen uit de fabriek. De vele levens van de bungalows van Danilith-Delmulle," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam, Antwerpen: 010/ Vai/ CVAa, 2006): 230-247.

32. Hilde Heynen, "Belgium and the Netherlands".

33. Only 6% of the Flemish housing stock is social housing; this amount has remained stable over the last years, despite several government programmes to increase the social housing stock. Home ownership is still increasing however (Ryckewaert et al. 2012).

34. Bruno De Meulder, "De Belgische Stedenbouw en de Behoefte van Welvaart 1945-1975. 10 Punten Over de Veranderende Productie van het Wonen," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam/ Antwerpen: 010/ Vai/ CVAa, 2006): 128-145.

35. Jacques Denis, *Geografie van België*. ed. by Jacques Denis (Brussel : Brussel : Gemeentekrediet, 1992, 1992).

In 1997, the Spatial Structure Plan for Flanders (RSV) based on the principle "Flanders, urban and open" was adopted. The RSV intended to reverse the spatial trends towards further sprawl and aimed to protect the countryside and natural landscapes from further urbanisation. It prioritized reinforcement of the urban areas; 60% of the new houses had to be built in delineated urban areas. In the slipstream of the RSV, the housing stock has been diversifying to a modest extent, but its ambitions have not been met.[36] The architectural profession, largely agreeing with the diagnosis of the RSV that further sprawl is to be discouraged, is exploring new housing types offering an alternative to the single family dwelling, which would better fit the actual housing demand.[37] Collective housing types and shrinking plot sizes have thus led to a decrease in the average size of newly built dwellings.[38]

A large number of investigations have shown, however, that the majority of the Flemish population, including youngsters[39], still aspires to own a large house with private garden outside the city.[40] The detached dwelling is very strongly tied to Flemish socio-cultural norms and aspirations (a popular saying holds that Flemish people are born 'with a brick in their stomach'). These aspirations tie into a system of traditionally developed construction methods and zoning regulations, the whole forming a complex, socially defined technological system. Hughes argues that such systems, because of their complexity, obtain a certain momentum in their development, which makes it difficult to change their course.[41] Given the challenges to this housing model outlined in the introduction, it seems however that change is necessary. In order to better understand the possibility for change, our research project set out to investigate what kind of resistances would be found among home owners against possible transformations of their neighbourhood.

36. Karina Van Herck, and Bruno De Meulder, eds., *Wonen in Meervoud. Groepswoningbouw in Vlaanderen 2000-2010* (Nijmegen: SUN, 2009); Isabelle Thomas, Dominique Vanneste, and Xavier Quérriau, *Atlas de Belgique. Habitat/ Atlas van België. Wonen* (Ghent: Academia press, 2011).

37. Architecture Workroom Brussels, *Naar een visionaire woningbouw*; Joachim Declerck, Michael Ryckewaert, and Stefan Devoldere, eds., *Pilootproject Wonen, Nieuwe vormen van collectiviteit* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013).

38. De Decker et al., *Ruimte voor Wonen*, 22; Vanneste et al., "Woning en woonomgeving in België", 61-66.

39. Ann Verhetsel, Frank Witlox, and Nele Tierens, *Jongeren en Wonen in Vlaanderen. woonsituatie, woonwensen en woonbehoeften* (Antwerp: De Boeck, 2003).

40. (for an overview see De Decker, "Understanding housing sprawl".

41. Thomas P. Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems*, ed. by Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch (Cambridge, London: The MIT Press, 1987): 51-82. 57-58.

42. James C. Clingermayer, "Heresthetics and happenstance: Intentional and unintentional exclusionary impacts of the zoning decision-making process," *Urban Studies* 41, no. 2 (2004): 381.

3. NIMBY attitudes and the need for a sustainable transformation of neighbourhoods

From the literature it can be deducted that home owners in residential neighbourhoods are likely to put forward a series of NIMBY arguments against a possible transformation of their neighbourhood. Home owners in Flemish low-density neighbourhoods have for the major part commissioned the building of their homes themselves under zoning regulations, involving scale, typology, positioning and appearance of the building. This personal investment of time, money and energy results in a reluctance of many inhabitants to deal with alterations in their immediate environment, often giving these residential neighbourhoods a somewhat exclusionary character. Clingermayer argues that the unwillingness to accept changes can amount official protest against plans for alternative housing types, based on 'parochial or in other ways suspect' motivations.[42] Hayden's findings in the USA have shown how idealized suburban life prevents the alternative re-use of the existing housing stock.[43] Similar to the USA, residential neighbourhoods in Flanders are often 'mummified' by the current regulations.[44] Encountering NIMBY attitudes in response to transformation schemes can therefore be expected.[45] Taking into account the continued appreciation of the detached dwelling, we expected to encounter the least resistance against a development scheme that would remain close to the current density, typology and outlook of Flemish suburban neighbourhoods.

In Flanders, the 1997 Spatial Structure Plan (RSV) has been criticized for not acknowledging the real housing desires of the population.[46] In line with recent efforts to give the Flemish citizen a voice in the decision process on spatial planning[47], it is our aim to involve the perspective of the inhabitants in evaluating the potential for transformation of their low density residential environments. Furthermore, it is essential to know how inhabitants react to initiatives of public and private parties involved in building development processes[48], especially with regard to how change

43. Dolores Hayden, *Redesigning the American dream : the future of housing, work, and family life* (New York: Norton, 1984).

44. Avi Friedman, *Planning the New Suburbia; Flexibility by Design* (Vancouver: UBC Press, 2002), 53.

45. Philip R. Berke, "Does Sustainable Development Offer a New Direction for Planning? Challenges for the Twenty-First Century," *Journal of Planning Literature* 17, no. 1 (2002): 21-36; Christophe Cneut, Rik Houthaeve, Sunay Durgun, Piet De Rycke, Pascal De Decker, Maarten Loopmans, Bart Claessens, Sven De Bevere, Xaveer De Geyter, David Schmitz, Yannis Igodt, and Dominique Vanneste, *(Her)gebruik van de Bestaande Woningvoorraad in de Klassieke Woonwijken uit de Jaren 1960 - 1980* (Brussels: Vlaamse overheid, departement RWO, 2009); Carissa Schively, "Understanding the NIMBY and LULU Phenomena: Reassessing our Knowledge Base and Informing Future Research," *Journal of Planning Literature* 21, no. 3 (2007): 255-266.

46. Ann Pisman, Georges Allaert, and Piet Lombaerde, "Ideaal wonen vanuit het perspectief van de bewoner," *Ruimte & Maatschappij* 3, no. 2 (2011): 23-44.

47. Pisman et al., "Ideaal wonen vanuit het perspectief van de bewoner"; Peter Triest, and Wiet Vandaele, "Verhaal zkt. vertellers," *Ruimte* 3, no. 11 (2011): 44-47.

48. Schively, "Understanding the NIMBY and LULU Phenomena".

in residential areas could be implemented – either top- down by planning experts and government action, or bottom-up in the form of development of small-scale projects by individuals. Williams et al. have argued that change in the built environment, affecting the detached dwelling as a common type, might be socially acceptable as long as it remains abstract, but is likely to incite protest when made concrete in a specific environment.[49] The 'good for all' indeed is often not appreciated when it starts to affect the 'good of the individual'. Anyhow, in a democratic society approval and understanding of involved *inhabitants* should be a prerequisite for alterations.[50]

With respect to our starting point of the multiple challenges facing Flanders' spatial development and housing stock, we have to admit that merely facilitating individual interests of inhabitants would only result in a status quo in conflict with the 'public interest' for change. In the field of spatial planning this 'public interest' can indeed be equated with sustainable development.[51] It is clear, however, that only taking into account all the individual interests of the inhabitants would result in a situation that counteracts sustainable redevelopment. We are wondering, nevertheless, whether the implementation of transformation strategies that diametrically oppose the individual interests of the inhabitants, could ever offer a valuable solution. It rather seems preferable, as Lancksweerdt argues, that the 'public interest' or the goal of sustainable redevelopment should not be determined, protected or served only by experts or by the government.[52] It rather should be constructed on the basis of dialogue between diverse public and private parties. This process would allow to include a plurality of viewpoints and would thus result in a strategy that is more in tune with the very complexity of contemporary society. In this context, the redevelopment of residential neighbourhoods would become an 'overarching interest' which combines diverse norms and desires, bridging the gap between individual and public interests. Our fieldwork serves this search for an 'overarching interest'

49. Katie Williams, Elizabeth Burton, and Mike Jenks, "Achieving the Compact City through Intensification: *An Acceptable Option?*," in *The Compact City: A Sustainable Urban Form?*, ed. by Mike Jenks, Elizabeth Burton and Katie Williams (London: E & FN Spon, 1996): 83-96.

50. Vestergaard, "Single family detached housing".

51. Pisman et al., "Ideaal wonen vanuit het perspectief van de bewoner".

52. Erick Lancksweerdt, "Naar een andere constructie van het algemeen belang," *Tijdschrift voor bestuurswetenschappen en publiekrecht*, no. 2 (2011): 103-105. Quoted in: Pisman et al., "Ideaal wonen vanuit het perspectief van de bewoner".

and for publicly supported strategies to transform low density neighbourhoods in a more sustainable direction. This approach is also in line with recent trends such as collaborative and adaptive planning, taking into account implicit and inherent normality or even the non-normative notion of adaptive capacity of residents.[53]

53. Claudia Basta, and Stefano Moroni, eds., *Ethics, Design and Planning of the Built Environment* (Dordrecht: Springer, 2013).

4. Mapping potentialities for change

In order to generate ideas of a geographical logic for neighbourhood transformations, we developed an indicator of the potential for re-use and densification of underused detached housing, taking into account several variables related to sustainability. It was our primary goal, in developing this indicator, to take into account not only characteristics of individual dwellings but also their spatial location, which is determining transportation needs. This 'indicator of potential' thus relies upon a combination of factors, including potential of the buildings themselves (surface and quality), mobility, servicing and population dynamics.[54] First, as a general rule, we took into account (a proxy of) amenities and personal services. As a proxy for the presence of central functions, we used the Belgian system of neighbourhood outlining in which a clear distinction was (and is) made between town and village cores (with amenities), secondary neighbourhoods with concentrated housing and neighbourhoods with dispersed housing; this is embedded in the codification of all ca. 10.000 neighbourhoods in Flanders. Second, the accessibility of employment was integrated by taken into account the distance to regional and major cities which represent important employment centres as well as the availability of a railway station which normally goes in pair with a major bus stop. Third, the population dynamics were taken into account by calculating positive and negative deviations from the Flemish average. Fourth, the potential (for densification) related to the dwelling as such was incorporated by indicators such as age (the newer the better), size (the bigger the better) and quality in terms of energy consumption (See table 2, appendix 1).

54. For now, the indicator is in an experimental phase of exploring possible methodologies. The present indicator is based on statistics, available on the neighbourhood level. Results would probably improve if the proximity of secondary neighbourhoods of the core neighbourhood can be better elaborated (e.g. with GIS functions such as adjacency) and should take neighbourhood densities into account. Furthermore, the series of chosen variables can benefit from adding cadastral information as well as information (map layers) of areas in danger of flooding and natural or ecological values. Nevertheless, in this stage, the mapped indicator shows the spectrum of potential for re-use and densification on the scale of neighbourhoods, starting from the existing housing stock and taking mobility into account.

The indicator has been calculated for all underused detached dwellings and an average was taken and mapped on the neighbourhood level.

This generated an explorative pattern showing municipalities and neighbourhoods with different levels of potential (**figure 40**). It appears that municipalities and neighbourhoods located in the agglomeration of major cities or in the 'Flemish diamond' – the centrally located region between the cities of Ghent, Antwerp, Brussels and Leuven – achieve the highest scores on the indicator; meaning that they have a high potential for sustainable development in contrast to the more remote rural municipalities which score rather low. This is consistent with the idea that closeness to a city will necessitate less transportation, and will thus, from an ecological point of view, be preferable to a rural location. Although several caveats should be taken into consideration[55], the methodology, resulting in this map looks promising as a possible instrument for discussion and negotiation of spatially selective policies implying that the whole set of planning tools, subsidies and fiscal instruments might be spatially differentiated to transform existing residential neighbourhoods. The explorative character of this indicator is such that it would be entirely premature to already advocate its immediate use but it shows its possibilities as a well grounded basis for spatially selective policies. Such spatially selective policies were suggested already in a report on Belgian housing in 1999.[56] Of course, the threshold for switching between various strategies, such as phasing-out, construction bans or limitations and densification should be validated in a discussion with various stakeholders. We do believe that differential policies will be necessary in the future. They could imply densification strategies on the one end of the spectrum (encouraging additions and infill on the level of plot or building) and phasing-out scenarios on the other end, possibly including construction bans. Such a spatially selective policy could only be realised on the basis of a spatial vision for the future of the Flemish region, which would be widely

55. First, the data that compose the indicator must be available on the neighbourhood level; second, the (weights of) scores can influence the result and must be tested extensively, third, a combination of data and methodologies are required such as statistical data combined with object oriented data in GIS.

56. Luc Goossens, Isabelle Thomas, and Dominique Vanneste, *Huisvesting in socio-economisch en demografisch perspectief 1981-1991* (Brussels: Ministerie van Economische Zaken, Nationaal Instituut voor de Statistiek, Federale Diensten voor wetenschappelijke, Technische en Culturele Aangelegenheden, 1999).

supported. The map we present can therefore be interpreted as both an argument in favour of the idea of centrality and compactness, acknowledging its logic in a concrete geographical setting, and as a challenge to unsustainable areas to elaborate strategies for improvement and reinterpretation.

5. Specific scenarios for discussion with home owners

A differential spatial policy might take the form of different spatial strategies to be deployed for different areas. Depending on the location, transformative micro-strategies applied to low-density residential neighbourhoods might relate to different macro-strategies, inducing either compactness and concentration of habitation and amenities, or reinforcing an isotropic dispersal of densities and functions. While the *compact city* approach projects a firm concept top-down on a region characterized by sprawl, it has a counterpart in the bottom-up *dispersed city* concept. These two concepts illustrate two extremes between which other, hybrid models, can be placed, and which both play a strong role in Flemish spatial planning.

The compact city, regardless of its being considered a broad concept without very clear definitions or scale, is quite influential in politics, planning and urban design.[57] It mostly evokes the image of a single, high density, urban municipality with a green hinterland. The benefits of the ideal of compactness are however often discussed as theorists doubt whether it allows equity[58], and whether its focus on form, and underexposure of process, evolution and usage, truly help in achieving a sustainable environment.[59] In Flanders, the question is raised whether the compact city offers a fitting paradigm for the specifically *diffuse* situation of the region.[60] The 1997 RSV has adopted the concept of compactness and projected it on the local Flemish context, through its proposals for densification in urban regions and protection of existing open spaces. By formulating the concept of 'deconcentrated bundling', it proposed to strive for compactness of the main city centres, but

57. Elizabeth Burton, "The Compact City: Just or Just Compact? A Preliminary Analysis," *Urban Studies* 37, no. 11 (2000): 1969-2001; Mike Jenks, Elizabeth Burton, and Katie Williams, eds., *The Compact City: A Sustainable Urban Form?* (London: E & FN Spon, 1996); Willem Salet, "The compact city from a national policy perspective: Institutional resistance or institutional reform?," in *Compact City Extended: Outline for future policy, research, and design*, ed. by Luuk Boelens, Henk Ovink, Hanna Lara Palsdottir and Elien Wierenga (Rotterdam: 010 Publishers, 2011): 54-71.

58. Burton, "The Compact City: Just or Just Compact?"

59. Michael Neuman, "The Compact City Fallacy," *Journal of Planning Education and Research* 25, no. 11 (2005): 11-26.

60. André Loeckx, "De moeilijke kunst van het tweevoud. het ruimtelijk structuurplan Vlaanderen," *Archis*, no. 10 (1995): 48-53.

also of urbanised regions and smaller towns, hence appropriating the compact city model as far as the local context could reasonably allow for. The RSV has however failed to concretely project these ambitions on the actual diffuse Flemish landscape, and hence its ambitions were not met.

Alternatively, the *dispersed city* concept has taken centre stage, cultivated in European countries with diffuse and spread-out settlement patterns like Italy and, indeed, Belgium[61]. At its basis lies a descriptive and realistic interpretation of contemporary spatial structures[62], and a pragmatic, context-bound design approach towards intervention.[63] The acceptance of fragmentation as the current-day state of urbanism, is a basic element in diverse concepts built upon this paradigm, such as the 'Diffuse city'[64] or the 'Reverse city'[65], both concepts that are looking for the reinterpretation of urban sprawl and for the development of new forms of public space. The dispersed city concept nevertheless faces criticism for simply legitimizing commercial consumption of the little open space that is left.[66] In Flanders, several design practitioners endorse this theory and propose their projects within the diffuse Flemish landscape following its logic.[67] Nevertheless, it is also questioned in the Flemish context, as it is not clear how this paradigm could solve the problems of an ageing population, or how it could address the societal lack of awareness about the functional and ecological consequences of the chosen housing location.[68]

Based upon these two dominant paradigms, we have drafted three different transformative scenarios, in order to have a concrete basis for discussions with inhabitants. Each one of these scenarios relates to one of the spatial strategies *reconfiguration, replacement* or *removal* (**figure 27**) – whereby reconfiguration and replacement are both strategies deployed by the protagonists of the dispersed city concept, while the removal strategy would rather be applauded by those defending the compact city.

61. The neighbourhoods that served as case studies can by categorised based on their morphology and the way they were planned or built; ribbon developments, allotments, and residential parks or forests can be distinguished. The ribbon developments in this sample have densities ranging from 0,8 dwellings per hectare to 3,8 dwellings per hectare; for the allotments, densities range between 4,0 and 15,5 dwellings per hectare, and for residential parks and forests, densities range between 1,8 and 4,1 dwellings per hectare.

62. Bernardo Secchi, "Descriptive City Planning," *Casabella* 56, no. 588 (1992): 22-23, 61-62.

63. Bernardo Secchi, "The Periphery," *Casabella* 55, no. 583 (1991): 20-22, 60.

64. Stefano Boeri, "The Diffuse City," *Archis* 1999, no. 7, July (1999): 20-21.

65. Paola Viganò, "The Contemporary European Urban Project: Archipelago City, Diffuse City and Reverse City," in *The Sage Handbook of Architectural Theory*, ed. by C. Greig Crysler, Stephen Cairns and Hilde Heynen (London: Sage, 2012): 657-670.

66. Hilde Heynen, "Fragmentatie in de periferie: De 'tapijtmetropool' van Willem-Jan Neutelings," *Archis* 1990, no. 3 (1990): 16-21.

67. Pieter Uyttenhove, *Stadland België. Hoofdstukken uit de geschiedenis van de stedenbouw.* (Ghent: A&S Publishers, 2011).

The discussions with inhabitants took place during field work in 10 different municipalities (see **figure 5 and 39, below**), characterised by different spatial conditions. In order to enquire into social acceptance on the level of the residential environment, our three transformation scenarios were supported by graphic material – based on a prototypical representation of a neighbourhood tissue – to be quickly legible. In the interviews, these scenarios were shown and the researchers explained in what way these could come about, and what this could mean for the local housing stock. We discussed the strategies independently of neighbourhood scores assigned by the indicator of the potential for underused detached housing, and thus didn't hypothesize specific correlations between them (the two parts of the research were implemented in parallel – hence their incomplete integration).

Reconfiguration strategy

A first possible scenario for transformation of low density residential neighbourhoods towards more sustainability is based on transformation of dwellings and plots. Its main ingredient is that alterations, such as the subdivision of existing built structures, or the addition of small, single-household units on lots which before had only one single family dwelling would be facilitated or even encouraged. This scenario envisions a minimal role for the government, mainly on the level of the municipality. The role of authorities would be to raise the awareness of individual house owners about alternative patterns of building and inhabitation, and to provide the necessary alterations to the legal structure (e.g. zoning laws). If these adaptations are implemented, incremental infill could occur wherever there is a demand in such low-density residential environments.

Concrete examples of such transformations can be found mainly in a North American context, but also in France.[69] Constructing *accessory apartments*[70] has been studied mainly in North America since the 1980s in search of a mode for re-use of typical suburban

68. Dominique Vanneste, Lieve Vanderstraeten, and Isabelle Thomas, "Appreciatie van de woonomgeving en woon-plaats in de stad: een trade-off?," in *Zo lang de leeuw kan bouwen: Liber Amicorum Prof. Dr. Luc Goossens*, ed. by Pascal De Decker, Bernard Hubeau, Ilse Loots and Isabelle Pannecoucke (Antwerp: Garant, 2012): 155-184.

69. Here we will mainly discuss the literature from the USA and Canada. For the French situation we can refer to the 'Build in my Backyard' project, www.bimby.fr.

70. Accessory apartments, also called ancillary units or granny flats, are secondary dwelling units attached to a dwelling or built on the same lot. These are small residential units, attached to the main dwelling or built on the same lot, which are usually inhabited by a member of the family, such as a grandparent, who can benefit of this proximity.

neighbourhoods. In the USA and in Canada, this materialised as a search for a more collective cohabitation model replacing the typical suburban individualism[71], as a search for private benefits for home owners like extra income, more security and a shared maintenance of the building and plot[72], or as a search for flexibility in the light of demographical developments of the inhabiting population.[73] What is common to these approaches, is the acceptance of the notion that the suburbs are 'here to stay,' and that the question for other modes of habitation need to be inscribed in the existing built fabric, with certain caution not to ruin the original character.

Similarly in Flanders, in recent years multiple documents have been published by provincial governments, politicians and project developers about the potential of house subdivision.[74] Many obstacles for its implementation still exist[75], but the alternative use of single family houses is put forward as a solution to meet the demand for smaller dwellings in an ageing society, the preservation of the remaining open space and a reduction of the energy waste of the existing housing stock.

A recently published Green Paper[76] in preparation for the new Spatial Policy Plan, the successor of the RSV, cautiously puts the possible densification of residential neighbourhoods on the agenda. Likewise the preliminary documents for the new Housing Policy Plan consider the potential of house subdivisions in existing residential neighbourhoods.[77] Since 2009, with the implementation of the new Decree on Residential and Home Care and its translation into the Flemish Codex of Spatial Planning, accessory apartments in single family houses are officially allowed and exempted from a building permit if some very specific criteria are fulfilled: a demonstrable care relation between the inhabitants, a minimum age for the care dependent resident, and reversibility of the architectural intervention after the suspension of the care relation. This is a first sign that such infill scenarios are to be taken

71. Hayden, *Redesigning the American dream*.

72. Patrick H. Hare, and Jolene N. Ostler, *Creating an Accessory Apartment* (New York: McGraw-Hill, 1987).

73. Friedman, *Planning the New Suburbia*.

74. Architecture Workroom Brussels, *Naar een visionaire woningbouw*; Femke Coopmans, and Wolfgang Verraes, *Kangoeroewonen: een mens- en budgetvriendelijk woonidee* (De Pinte: Wolfgang Verraes, 2005); Frouwke Bormans, Bert Van de Vijver, Grete Gysen, and Hilde Van Ransbeke, "Woningopsplitsing: Richtlijnen voor de kwalitatieve opsplitsing van woningen in meerdere wooneenheden", ed. by vzw Stebo (Hasselt: Provincie Limburg, 2011); Provincie Vlaams-Brabant, "woningdelen.een volwaardig woonalternatief?", (Leuven: Provincie Vlaams-Brabant, 2010); Mieke Vogels, *Het nieuwe wonen. Vlaams woonbeleid op nieuwe sporen.* (Leuven: Lannoo Campus, 2012).

75. For an overview see Wouter Bervoets, and Hilde Heynen, "The obduracy of the detached single family house in Flanders," *International Journal of Housing Policy* 13, no. 4 (2013): 358-380

76. Vlaamse Overheid, "Groenboek Vlaanderen in 2050: mensenmaat in een metropool? Beleidsplan Ruimte Vlaanderen", (Brussels: Vlaamse Overheid, Departement RWO, 2012).

seriously. We therefore expect that this scenario is to encounter the least resistance from the respondents.

Replacement strategy

The strategy of replacement envisions new, large scale developments next to neighbourhoods of detached dwellings in order to create new nodes in the urbanised landscape. These 'gravity points' could take the form of complete projects involving housing, public and commercial spaces, and would rather occur on strategic locations related to these neighbourhoods. The inhabitants of these neighbourhoods could profit of these amenities and consider moving to new dwelling types, thus applying the concept of 'ageing in place' to the neighbourhood. Such interventions also introduce public space in these residential neighbourhoods, a strategy which is discussed by Segal and Verbakel in the light of the decreasing importance of central public space and the emergence of new terrains of public interaction under conditions of sprawl.[78]

In such a scenario, authorities have to play a stronger role than in the previous one, as the municipalities would have to allow for this new functional infill and for the rearrangement of valid zoning plans. Also, home owners play a rather passive role, and developers a more active role, as this would involve the addition of large scale projects in a symbiosis with the existing dwellings.

Such developments are not completely new to the Flemish context, although, in practice, they rather take shape in an ad-hoc way, resulting in linearity rather than concentration. Commercial ribbons along important connector roads between urbanised cores have come about in such a way. Also, urban housing typologies such as apartment buildings and retirement homes are found in these ribbons. These residences occasionally take shape as private domains with luxury apartments. The ribbons consisting of diverse amenities are morphologically juxtaposed to the low density residential neighbourhoods in the hinterland which they

77. Agentschap Wonen Vlaanderen, "Debatnota Woonbeleidsplan Vlaanderen", James Van Casteren, afdelingshoofd Woonbeleid, (2011) <https://www.wonenvlaanderen.be/uploads/documentenbank/e32dff72cc4f83777aa3a066648b1561.pdf?ht=1> [Accessed 06 June 2013]. Freya Van den Bossche, "Wonen in Vlaanderen 2050: Krijtlijnen van een Toekomstvisie", Flemish Ministry for Energy, Housing, Cities and Social Economy, (2012) <https://www.wonenvlaanderen.be/uploads/documentenbank/c9dbbc8ee62092f878b48d895560a4cb.pdf?ht=1> [Accessed 06 June 2013].

78. Rafi Segal, and Els Verbakel, "Introduction: Urbanism Without Density," *Architectural Design* 78, no. 1 (2008): 6-11.

functionally service – so functionally they already perform in a way our replacements are imagined to work.

In the Flemish landscape, there are also already a limited amount of examples of complex projects, which combine diverse housing types with amenities and public space and as such service also the surrounding neighbourhood. The outlined scenario somehow holds the middle between the pragmatism of ribbon development and the coherence of the urban renewal projects one now finds in brownfield locations in Flemish cities and village centres. It foremost builds upon a combination of amenities and new housing typologies.

Removal strategy

Besides reconfiguration and replacement, we also proposed a strategy of removal, inspired by discussions on shrinking regions, or on 'unbuilding' of obsolete dwellings. Such a strategy is framed in a scenario envisioning the gradual demolition of low-density areas – in casu, areas with many underused dwellings – sacrificing part of the stock of (structurally[79] underused) detached dwellings, for landscape restoration and densification in urbanised cores. In this scenario, the government is supposed to take a strong lead and to also invest financially as well as organisationally in a revision of the residential landscape. Developers would be able to still play an important role in providing housing, however only in more central, urbanised contexts. Individual home owners could possibly negotiate with the government to swap one property against another one. The demolition of the (sub)urban fabric in general, and of dwellings in particular, has not often been connected to the luxury problem of oversized living, but it has been discussed for shrinking regions, such as parts of the former German Democratic Republic.[80] Eastern Germany's decrease in population and the ensuing falling apart of the network of infrastructure and amenities[81], however offer a perspective significantly different from the Flemish context, where growth is still in order.[82]

79. We defined a dwelling 'structurally' underused if the characteristics of the dwelling are such that it can be labelled 'underused' even when inhabited by a family with two children. According to these criteria, the number of 'structurally' underused dwellings in Flanders is ca 210.000, the number of 'structurally' underused detached dwellings is ca 130.000.

80. Philipp Oswalt, ed., *Shrinking Cities Volume 2, Interventions* (Ostfildern: Hatje Cantz, 2006).

81. Stephan Beetz, Sandra Huning, and Tobias Plieninger, "Landscapes of Peripherization in North-eastern Germany's Countryside: New Challenges for Planning Theory and Practice," *International Planning Studies* 13, no. 4 (2008): 295-310.

82. As predicted for the development of the Belgian population until 2060 (FPB and ADSEI 2013).

In Flanders, demolition of obsolete and/or structurally underused buildings is not yet a serious topic of political debate, but is already part of planning strategies in speculative design proposals, as for example proposed by POSAD.[83] From a purely ecological point of view, one can argue (and some have argued) that a significant amount of detached dwellings are unsuitable anyhow for adaptation in line with increasing standards of comfort and energy-efficiency, and that it is thus better to simply demolish them, without replacing them in the same spot by new houses. This type of intervention would enable a restoration of open space.[84] Whereas only some years ago many would have dismissed this option as totally unrealistic, there are now signs that the authorities are increasingly open for it. The so-called Green Paper[85], e.g., which is a report about tendencies, opinions and possibilities for the spatial future of Flanders states the intention to densify cities while actively fading out (deconstructing) decentralized suburban allotments.

83. POSAD, "Flemish Metropolitan Dream"2012) <http://www.posadlabs.com/flemish-metropolitan-dream/> [Accessed 07 March 2013].

84. Han Vandevyvere, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen" (unpublished doctoral dissertation, University of Leuven, 2010).

85. Vlaamse Overheid, "Groenboek Vlaanderen in 2050".

6. The public support for transformation strategies

For the benefit of clarity, this article will mainly focus on our findings and comparison of the four neighbourhoods at both extremes of the spectrum which emerges from the geographic analysis of potential. The two best scoring neighbourhoods are 'Bruynenbaert' in Aartselaar and 'residential forest Deurle' in Sint-Martens-Latem, located respectively in the agglomeration of the major cities of Antwerp and Ghent (**see figure 39 below, numbers 3 and 2**). Both neighbourhoods are morphologically significantly different (**figure 41**). In Aartselaar, 'Bruynenbaert' is a masterplanned neighbourhood characterised by rather modest building lots and modest house sizes. Inhabited by larger and younger families, these houses are not necessarily underused. In Sint-Martens-Latem, 'residential forest Deurle' is a more upmarket neighbourhood created through the gradual subdivision and development of an old forest. It is characterised by rather spacious building lots and house sizes. The houses are underused, even

when inhabited by families with children. The neighbourhoods with the lowest scores are 'Laren' in Lummen and 'Tjammelstraat' and 'Oudenaardseweg' in Wortegem-Petegem, both located in municipalities in rural residential zones (**See figure 39 below, numbers 9 and 10**). In Lummen, 'Laren' is an old hamlet that has been expanded through ribbon developments. In Wortegem-Petegem, 'Tjammelstraat' and 'Oudenaardseweg' are ribbon developments located in between two hamlets (**figure 42**).

Responses to the reconfiguration strategy

When presenting this first scenario, several respondents referred to the presence of already subdivided houses in their neighbourhood. Some of these houses had been subdivided in line with the strict regulations; other houses had over the years been subdivided without building permit. Most respondents made no objection against this phenomenon – as long as they didn't experience any nuisance from it and as long as the changes to the exterior remained limited. Also the subdivision of building lots is a practice people are quite familiar with and which is relatively well tolerated. Several respondents used an extra official building lot as additional garden space, or their building lot was large enough to be subdivided according to the existing local zoning regulations. Eventually in the future, this extra land might be built upon by one of the children or grandchildren or it would be capitalized when selling the house. Because of this familiarity with existing practices of subdivision, we noted a reasonable public support for our reconfiguration strategy, with the positive comments outnumbering the negative ones.

This public support can also be explained by the deeply rooted economically liberal attitude of the Flemish population. Individual adjustments such as house subdivisions were certainly acceptable, or as many of our respondents articulated it: *"My neighbour can do whatever he wants on his lot; it is not my business"* (Aartselaar_W5, Man, 73 yo). Some believed this strategy could generate

more lively neighbourhoods: *'I don't mind. Young families might bring some life to the neighbourhood'* (Sint-Martens-Latem_W3, Woman, 64 yo). Other respondents saw certain benefits in the strategy: the creation of more affordable housing or the stimulation of more efficient land use. This type of support declines however when people feel individually affected: in case numerous houses or parcels would be subdivided in their immediate vicinity, they are clearly less accommodating. On the negative side, extra households tend to be associated with extra traffic, degradation of the green character of the neighbourhood and a loss of privacy for the individual dwellings. Some respondents also mentioned how the possible inflow of 'another kind' of people (clearly referring to marginalised groups such as unemployed people or welfare mothers) could lead to social problems. Since in Flanders the house is an important piece of property and often even the most important asset people own, one can understand that home owners were also concerned with changes that might negatively affect the resale value of their house.

Our analysis doesn't show any important link between the neighbourhood scores assigned by the potential indicator for underused detached housing and the public support for the reconfiguration strategy. At both extremes of the indicator spectrum – Aartselaar and Sint-Martens-Latem versus Wortegem-Petegem and Lummen – people share many concerns, such as a clear preference for the preservation of the 'residential' or 'rural' character of their neighbourhood. The public support seems more related to the individual attitude of the respondents or to the morphology of the neighbourhood. For example, the public support for lot subdivision in the residential neighbourhood in Aartselaar, characterised by rather small parcels, was notably lower than in the residential forest in Sint-Martens-Latem characterised by more spacious lots.

Responses to the replacement strategy

When confronted with the scenario involving rigorous replacement, some respondents reacted favourably to the idea of new public and commercial facilities at walking distance of their home. They especially liked this possibility in view of their inevitable ageing. Other respondents saw the possible construction of apartments in their vicinity as an advantage, since it would enable them to move to an apartment in their current neighbourhood when they could no longer maintain their house. The construction of apartments was also advocated as a way to create more affordable housing for the younger generations, or as an alternative for the still expanding ribbon developments. Negative comments on the replacement strategy however outnumbered the positive ones. Many of our respondents feared that a 'gravity point', when realised in their immediate vicinity, would result in a deterioration of the green and quiet environment they had so specifically opted for. Also, an increase in social problems and decrease of real estate values were perceived as possible threats. Some respondents considered multifamily dwellings as an inappropriate building typology for the suburban or rural context they were living in: *"To my opinion, this would really be sad. Such complexes should be built in or around a city, but – God forbid – not in the countryside. Flanders has already been turned in one large city – let's please preserve something of countryside."* (Wortegem-Petegem_W4, Woman, 73 yo). Some also questioned the need for bringing public or commercial facilities to the neighbourhood: "*If you choose to live here, you know that* [there is a lack of facilities]*, if that is not agreeable to you, please get up and leave"* (Wortegem-Petegem_W4, Woman, 73 yo). The use of the public space imagined in these possible 'gravity points' also raised concerns: "*Here, most people have a private garden, so what use would we have for public space? Creating a gathering place where children of thirteen year old could smoke cigarettes out of sight of father and mother? One wonders about the risks involved"* (Sint-Martens-Latem_W1, Man, 67 yo). Other respondents rejected the replacement strategy

because they considered their house already at walking or cycling distance from the facilities in the existing village centre. Others on the contrary considered their neighbourhood to be located too far from the local town centre and thus inappropriate for new developments, which in their eyes had to be concentrated in the town centre.

As in the previous scenario, our analysis didn't find any direct links between the score assigned in the potential indicator for underused detached housing and the public support for this, more invasive, scenario. At both extremes of the indicator spectrum older respondents seemed to see more benefits in the advent of apartments and shops in their neighbourhood, as it would allow them to age in place more comfortably. But among the older respondents there was also an important group of people who were planning to move out to a more urban and central location and they were less inclined to make concessions for the time they had left in the neighbourhood. The hope to age in place was more pronounced in the rural municipalities of Lummen and Wortegem-Petegem, where multiple respondents were born and raised, compared to Sint-Martens-Latem or Aartselaar where several inhabitants expressed the hope to move back one day to the nearby cities of Ghent or Antwerp. But we also noted subtle differences between Sint-Martens-Latem and Aartselaar: our respondents in the first municipality seemed to be more concerned about the social status and overall appearance of their neighbourhood then those in the second. Also between the rural municipalities of Lummen and Wortegem-Petegem differences could be noticed. In Lummen the scenario involving intrusive replacement strategies was seen by some respondents as a possible strategy to revive the old hamlet, while our respondents in the ribbon developments of Wortegem-Petegem rather perceived it as a disruption of the rural character.

Responses to the removal strategy

Again some respondents saw benefits in a landscape recovery

strategy: "*This scenario would give us some open space back* […] *our lot would become a really nice piece of land that way*" (Wortegem-Petegem_W2, Woman, 63 yo). However, similar to the previous strategy, the negative comments outnumber the positive ones. Some feared it would destroy the social life in their neighbourhood or would make detached housing unaffordable: *"In that case, living on the countryside would only be affordable for rich people, other people would be forced to live in apartment buildings"* (Lummen_W4, Woman, 56 yo). Others feared the negative impact on real estate prices: "*I doubt homeowners will strongly favour this, it certainly doesn't generate an added value for the houses"*(Aartselaar_W3, Man, 72 yo) (note that the two comments are contradictory – the one forecasting a rise in real estate values, the other a drop). The most common criticism focused on the perceived lack of political and financial feasibility of this scenario: *"A minister who would propose such a thing wouldn't get a single vote anymore"* (Lummen_W1, Man, 71 yo) and *"There will never be enough money for this, I can't imagine a government doing this*" (Aartselaar_W3, Man, 72 yo). Because of the overall satisfaction with the existing green in their neighbourhood, the sensibility of the scenario was questioned: *"This is completely unrealistic. In Deurle we already have a forest, but nobody is using it, nobody is entering it* [...] *because people in this neighbourhood have a large private garden"* (Sint-Martens-Laten_W2, Woman, 70 yo). Instead of demolition, respondents argue for the protection of existing open areas and for the transformation of existing neighbourhoods in Flanders.

Again, the public support for such 'unbuilding' seems to be independent of the scores assigned by the potential indicator for underused detached housing. If people saw benefit in it, then it was for other neighbourhoods but certainly not for their own: some inhabitants of residential neighbourhoods for example favoured the conversion of ribbon developments into open landscapes, while some inhabitants of the ribbon developments perceived

removal as a useful strategy to create more green areas in urban areas. Also when comparing the public support between residential neighbourhoods, differences could be noted: while in the master planned residential neighbourhood of Aartselaar many inhabitants perceived unbuilding as a decline of their neighbourhood, in the residential forests of Sint-Martens-Latem some respondents saw it on the contrary as a restoration and reinforcement of the natural elements. Parallels can be drawn with our two rural case studies at the other end of the sustainability spectrum: in the old hamlet of 'Lummen' some respondents saw the 'dilution' scenario as the demise of their neighbourhood, while in the more dispersed ribbon developments of Wortegem-Petegem, some respondents welcomed the restoration of the open landscape in which they once built their house.

7. The search for an 'overarching interest' for neighbourhood transformations

As expected, our public support analysis indicates a strong NIMBY attitude. Nevertheless, our analysis also provides us with some useful elements to break through the inertia of low density residential neighbourhoods in Flanders. It is clear that the reconfiguration strategy raises least resistance among the residents. This strategy leaves the neighbourhood character most intact and the approach is most closely related to the tradition of piecemeal parcel-by-parcel urbanisation, the laissez-faire attitude of the population and the already common practice of (informal) house and parcel subdivisions. For a sustainable redevelopment of residential neighbourhoods, a new policy could thus be to tolerate and even stimulate house subdivisions in selected areas. As multiple respondents argued, this shouldn't imply an elimination of restrictive zoning plans, but it would on the contrary demand a new set of very clear building guidelines, regulating the minimum distance between buildings, maximum building heights and densities, and extra parking spaces for the extra families. Our respondents demanded that the actual inhabitants should be

involved in the setting up of these rules, to ensure a good balance between the transformation process based on private initiative and the need to protect the overall green neighbourhood character.

Additionally, the NIMBY attitude against the replacement and removal strategies can and must be nuanced. As our respondents argued, their final approval or disapproval of the replacement strategy would strongly depend on its spatial integration in the neighbourhood, the size of the project, the proximity to the town centre, the architectural style of the buildings, the foreseen public facilities, and the sort of inhabitants the project would house. The final approval or disapproval of a strategy facilitating unbuilding strongly depends on the specific location, the costs versus benefits analysis, and the age and structural condition of the houses to be demolished. For all three strategies overlaps between individual and public interests can be found. As such these three strategies can be complementary. The replacement strategy could for example be applied as a strategic instrument for the revival of rural village centres, in combination with reconfiguration of the nearby low density residential neighbourhoods. Additionally the removal strategy could be applied as a stepwise approach for strategic landscape recovery projects, to reconnect precious natural landscapes at specific sites in the ribbon developments.

In general, people are very satisfied with the living environment they consciously opted for, but we also noticed among our respondents many individual concerns about the general sprawl condition in Flanders. Many respondents seem to have a love-hate relationship with the Flemish landscape. A sense of overpopulation because of a lack of open space and of natural landscapes, annoyance with the daily traffic congestions, with the limited offer of public transport in rural areas (at least perceived as such), the perceived ugliness of the ribbon developments…etc. all these elements lead to a feeling that the housing model and spatial planning in Flanders are problematic: *"Yes, in terms of urbanisation something should*

change in Flanders. It is no coincidence that we are termed 'the ugliest country in the world'" (Aartselaar_W6, Man, 74 yo). We also noticed concerns about the evolution of the real estate prices. Some respondents doubted that the current resale value of their house would be high enough to buy a comfortable, more centrally located apartment for their old age. Other respondents even feared a collapse of the real estate prices of detached, single family houses if nothing was adjusted: *"I believe home owners should accept the transformation of their neighbourhood. If not, we will end up in a couple of years in a situation in which these houses have become worthless"* (Sint-Martens-Latem_W5, Man, 54 yo). Other respondents were more worried about the difficulties of their children and grandchildren in finding an affordable house. Many respondents thus share one or more concerns of the sustainability debate, dependent upon specific social, economic and environmental elements which they experience in their daily life. Such quotes illustrate that, while inhabitants may be opposed to or in doubt about concrete design *strategies*, there is awareness of spatial issues which render the *scenarios* discussed plausible in the viewpoint of the interviewed inhabitants.

Taken as a whole, these individual issues with the Flemish sprawl landscape don't yet lead to a general sense of urgency with respect to the need to transform existing residential neighbourhoods. The overall satisfaction with the living environment is translated in a very limited demand for change, as change is at first associated with a deterioration of the current living quality. The transformation of their immediate living environment is often seen as a problem for the next generations, an evolution to which the original home builders shouldn't be exposed: "*As long as I live here, they shouldn't change too much.... but they can do whatever they want once I'm gone*" (Sint-Martens-Latem_W6, Man, 66 yo). But despite the NIMBY attitude, we believe that all the individual concerns with the Flemish sprawl landscape that surfaced through our interviews could 'nourish' the public debate about the need

for redevelopment of existing low density residential areas. We believe therefore that it is possible to increase the public support for neighbourhood transformations, by raising awareness about the inextricable link between the individual concerns of the inhabitants and the actual condition of the built environment in Flanders. It should become clear to the public opinion that solutions for seemingly individual problems (e.g. ageing in place, children who don't find affordable housing) can be found when accepting adjustments to the collective built environment. The role of the media covering urban planning issues shouldn't be neglected. Today, the reconversion of low density neighbourhoods remains a very rare phenomenon in Flanders and thus also invisible in the popular press. To increase the awareness and public support for neighbourhood transformations, we thus urgently need thought-provoking transformation projects – big and small – which succeed in the preservation of the actual neighbourhood character and qualities, and show the positive impact of densification in terms of amenities, personal services and mobility. This would also imply a break in the trend in real-estate development to keep fitting the concept of the detached dwelling on ever smaller parcels. Raising awareness combined with alternative and appealing projects might lead to the joint construction of an 'overarching interest'[86] which equally represents the interests of inhabitants, government, and advocates of sustainability.

86. Lancksweerdt, "Naar een andere constructie van het algemeen belang."

8. Conclusion

This article has aimed to generate a clearer perspective on the possible transformation of residential Flemish neighbourhoods, and the detached (often underused) dwellings that have shaped these neighbourhoods, in line with the debate on sustainability. By way of conclusion, we discuss the four main findings which have surfaced in our research.

First of all, our explorative analysis demonstrates that among the current residents – our respondent group consisted mainly of

ageing, first generation residents – only a rather limited public support can be expected for transformations that overcome the typology of the single family house or that drastically affect the residential character of the neighbourhood.[87] From our analysis emerge a number of conditions that determine whether specific interventions might be seen as acceptable or not. These conditions have to do with the role of the authorities – facilitating private initiative without direct intervention seems to be preferred – and with the safeguarding of the green neighbourhood character. Under these conditions, insertion of alternative housing types into existing residential zones might be possible without major resistance. This applies to both small incremental growth and large scale nodes with added amenities.

87. Also see Cneut et al., *(Her) gebruik van de bestaande woningvoorraad*.

Secondly, our research reveals how wide the gap is between spatial strategies imagined by urbanists and architects on the one hand and the everyday reality materialised in the omnipresent detached dwelling on the other hand. This gap however is not absolute: whereas the limited success of planning tools like the RSV in achieving more density and urbanity seems to challenge the attainability of compact city logic, the compact city nevertheless exists as a strongly present ideal in the perception of home owners who, however, consider the urban core to be the prime locus of densification, and see no benefit in local diversification and transformation of low-density residential areas. Even so, this perception of compactness is most of all projected on the historical centres, and thus often disconnected from the individual living environment idyll. In turn, the idea of living in a green environment is at odds with the reality of the existing built environment, which shows obvious aspects of dispersion. Our interviewees are most often not aware of such contradictions. Their ‘green’ environment (green in terms of vegetation, not in terms of sustainability) offers them a kind of staged rurality: the image of the countryside is more or less preserved, while the residents inhabit these areas in

an ‘urban’ way – relying upon a diversity of amenities that are only a car-drive away.

Thirdly, our research shows that the NIMBY attitude towards change is strongly connected with the high level of satisfaction of the inhabitants with their current living environment. Many inhabitants resist to changes because they associate it with the deterioration of the neighbourhood character and qualities. Taking all these individual interests into consideration would lead to a status quo. But our public support analysis also brought individual concerns with the sprawl landscape to the fore: the difficulty to age in place because of the lack of facilities or alternative housing typologies in the immediate vicinity of their current dwelling, the problem of traffic congestions, or the uncertainty of future real estate prices. These individual interests which exist among the inhabitants of low density residential settlements don’t conflict with the public interest. On the contrary, these individual concerns could nourish the debate on sustainable redevelopment of residential neighbourhoods, and alter it from a rather abstract and ideological ‘public interest’ into an ‘overarching interest’[88] supported by the inhabitants and even stimulated in a framework of collaborative planning.

Finally, our explorative mapping based on a promising, but still embryonic indicator, showed different potentialities between residential neighbourhoods in the Flemish region. Our parallel explorative fieldwork didn’t reveal a strong correlation between this objectified functional appreciation of neighbourhoods and the public support for specific neighbourhood transformation strategies. Our research shows that the public support for transformation rather relates to the individual situation of the home owners, as well as to the specific location or character of the neighbourhood. Both our explorative mapping and public support analysis imply that a generic solution for low density residential neighbourhoods in Flanders is difficult: we need to

88. Lancksweerdt, “Naar een andere constructie van het algemeen belang.”

develop spatially diversified policies with customised and site specific solutions. As a decision instrument for one or another transformation strategy on the neighbourhood scale, the indicator in its current, explorative form lacks flexibility on the one hand and is still sensitive for a number of caveats on the other hand. We see it in the first place as an instrument which underpins the plea for spatially selective policies in Flanders, and which could contribute - as one analysis among others - to raising public awareness about the need for such policies.

4

Reinterpreting detached dwellings: constructing a new conception of flexibility applicable to the Flemish house

This chapter delves into the built matter itself. The discussions with inhabitants of detached dwellings drew forward arguments in favour of a new kind of public interest, which could provide a basis for development of the housing model. Field work also included a precise documentation of the houses and lots inhabited by these respondents. This process delivered a cross-section of the Flemish detached housing stock, which facilitates an analysis of the buildings composing the residential environment. The documented objects are the material sediment of the culturally determined housing policies, building traditions and residential aspirations. This enquiry is developed in correspondence with the previous chapter, and researches typological aspects determining the aptitude of existing buildings to be transformed.

At this point, architectural analysis is introduced as a supplement to the actor-focused analysis in the previous chapter. This step facilitates looking deeper into some of the tentative results presented in the previous chapter. The image and the idea of the detached house remain integrated in the reconfiguration strategy, which incited the least resistance from the responding inhabitants. Still, few residents displayed interest in its small-scale concepts such as the sharing of lots or houses for their own situation. Architectural research here is formulated as a test of the built environment, to make explicit the technical possibilities and difficulties of subdividing a dwelling. Studying the documented houses, commonly reoccurring spatial configurations are singled out, and sensible design projections demonstrate how these configurations could be reinterpreted to facilitate adaptive reuse. This projection of alternative futures should also be read as a proposal (inherent to an architectural, projective thinking) of alternative schemes projected on traditional objects, which moves beyond a neutral documentation of (socially constructed) arguments.

Design thus re-enters in a diagnostic guise: it is used in a research of housing subtypes, and it draws forward aspects which could facilitate housing subdivision, in the most sensible way, by efficiently playing on built configurations; hence, introducing concealed opportunities in the societal discourse on sustainable housing. This supplementary analysis takes shape as a process of abstraction, which aims at drawing forward commonly reoccurring organisational forms in the particular segment of the housing stock. The search mainly revolves around the documentation of patterns which could facilitate subdivisions that can be implemented easily and are reversible. This is considered a precondition for the feasibility of dwelling transformations. As such, temporality and flexibility – of existing built configurations and of projected proposals of reuse – are discussed as guiding, normative principles, in order to come to easily implementable concepts, to limit demolition and costly interventions, and to devise an analytic instrument that also allows laymen to determine the hidden potential of a building.

Dwelling transformation as a method to create new homes

Redesigning, or retrofitting, existing built sites and infrastructure, diversification and shared usage (collectiveness) are topics of discussion in studies focusing on housing development and urbanism in Flanders.[1] Contemporary shifts in the housing market lead to the construction of new residential typologies which specifically address contemporary spatial and energetic standards, but leave the question open what to do with the existing, and rather inert, dwellings and neighbourhoods of decades past, especially since the existing housing stock contributes significantly to the production of greenhouse gasses.[2] The preceding chapter discussed the perspective of inhabitants of detached dwellings on transformation in the residential environment. This chapter complements previous results with a study determining how new meanings may be constructed in these residential environments, and does this from an analytical architectural perspective. Its unit of analysis is the dwelling itself, which results from the interaction with the other two tracks of the overarching research project (see **figure 1**). The concept of under usage on the level of the house is a shared notion, which was taken into account in this analysis of 65 dwellings visited during field work.

Adaptive re-use implies an improved life cycle of the built infrastructure, and it would decrease energy expenditure due to demolition followed by new construction and waste disposal.[3] Not only energy-oriented retrofits, but also subdivision and shared usage, have become regulated pathways for adaptation of residential units, however under strict conditions (table 4.1).[4]

1. Joachim Declerck, Michael Ryckewaert, and Stefan Devoldere, eds., Pilootproject Wonen, Nieuwe Vormen van Collectiviteit (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013); Peter Swinnen, Stefan Devoldere, Tania Hertveld, Joachim Declerck, Roeland Dudal, and Joeri De Bruyn, eds., *The Ambition of the Territory* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013).

2. Hugo Hens, Griet Verbeeck, and B Verdonck, "Impact of energy efficiency measures on the CO2 emissions in the residential sector, a large scale analysis," *Energy and Buildings* 33, no. 3 (2001): 275-281.

3. André Thomsen, and Kees van der Flier, "Replacement or renovation of dwellings: the relevance of a more sustainable approach," *Building Research & Information* 37, no. 5-6 (2009): 649–659.

4. This table was elaborated based on several documents published by the Flemish government: Vlaams Ministerie Ruimte Vlaanderen Woonbeleid en Onroerend Erfgoed. VEA (Flemish Energy Office), "Vlaamse Regering principieel akkoord met E70 vanaf 2012", ed. by Flemish Government (Vlaamse Regering) (Brussels, 2010). http://www.ruimtelijkeordening.be/NL/Beleid/Vergunning/Vergunningnodig [accessed 14 May 2013]. Also see Han Vandevyvere, and Griet Verbeeck, "Duurzaam Bouwen En Wonen," in Duurzame Ontwikkeling: Een Multidisciplinaire Visie, ed. by LONDO (Leuvens Onderzoeksnetwerk Duurzame Ontwikkeling) (Leuven: Uitgeverij Acco, 2009, repr 2013): 164.

Table 4.1:Legal framework for creating dwellings

Proposed physical action	**How to acquire a permit**	**Under regulation of which instrument?**	**Which energy standards apply?**	**Who makes the plan?**
Creating a 'granny flat' (zorgwoning) within an existing built volume	exemption	Codex spatial planning	None	Owner (with architect)
Creating a 'granny flat' (zorgwoning), expanding built volume	'Meldingsplicht': obligation to report expansions up to 40m².	Codex spatial planning	Soundproofing of separation walls	Owner (with architect)
Permanent subdivision of a dwelling	permit from municipal urban planning department; modification of allotment plan if typology changes	Allotment plan; RUP (or BPA); Codex spatial planning	Contemporary construction standards: determined by Flemish government 2014: E-level: E 60 K-level K 40	Owner with architect
New construction in an allotment (after demolition)	permit from municipal urban planning department; modification of allotment plan if typology changes	Allotment plan; RUP (or BPA); Codex spatial planning	Contemporary construction standards	Owner with architect
Creating a new allotment	Subdivision permit	RUP (or BPA); Codex spatial planning	Contemporary construction standards	Owner (with architect, urban designer or land surveyor)

Such design practice would provide traditional monofunctional residential neighbourhoods, such as Flemish allotments, with smaller dwelling types, in line with new demands on the housing market.[5] Subdivision capitalises on the generous proportions of Flemish dwellings: the average dwelling is considered to be 'large', certainly among the largest in Europe[6], especially the detached ones. But (how) can this potential of scale be unlocked? This chapter further explores the possibility of dwelling transformation, by adding an architectural argument to the qualitative results of the previous chapter, in order to determine if and how such a project can be feasible for the stock of detached dwellings in Flanders, and what design aspects of these dwellings facilitate such an intervention. It does so by proposing an explorative analysis of 65 detached dwellings. These dwellings are compared in order to distil generic characteristics of the Flemish housing stock, based on which redesign practice is feasible.

As will be explained further, this investigation outlines the development of an instrument to evaluate the potential and feasibility for alternative usage of traditional dwelling designs. This instrument takes shape as a theoretical model constructed on the basis of an inquiry into common parameters in a sample of dwellings, using abstraction as a method to highlight these commonalities. It intends to demonstrate those parameters which could be manipulated in a feasible way in order to re-use a traditional dwelling in an alternative manner. Methodologically, it fits in with an architectural tradition of defining types, based on structural, formal and functional analogies among a series of distinct, but comparable buildings, outlined by architectural theoretician Giulio Carlo Argan.[7]

Similar to Argan's outline of how typology is used in architecture, this categorisation involves an analytical aspect of historically developed building patterns, and a critical aspect which informs the question how architecture could respond to these historical

5. Pascal De Decker, Michael Ryckewaert, Brecht Vandekerckhove, Ann Pisman, Frank Vastmans, and Marie Le Roy, *Ruimte Voor Wonen, Trends En Uitdagingen* (Antwerpen, Apeldoorn: Garant, 2010); Michael Ryckewaert, Pascal De Decker, Sien Winters, Brecht Vandekerckhove, Frank Vastmans, Marja Elsinga, and Kristof Heylen, *Een Woonmodel in Transitie; Toekomstverkenning Van Het Vlaamse Wonen* (Antwerpen, Apeldoorn: Garant, 2012).

6. The average size of Belgian dwellings is a little over 130 m², while in countries like Sweden, the Netherlands and the United Kingdom, the national average lies between 70 an 80 m². See the comparison made in: Françoise Bartiaux, Guy Vekemans, Kirsten Gram-Hanssen, Dries Maes, Madeleine Cantaert, Benoît Spies, and Johan Desmedt, "Socio-technical factors influencing Residential Energy Consumption", (Brussels: Belgian Science Policy, 2005), 81.

7. Giulio Carlo Argan, "On the Typology of Architecture," in *Theorizing a New Agenda for Architecture: An anthology of architectural theory 1965-1995*, ed. by Kate Nesbitt (New York: Princeton Architectural Press, 1996): 240-246.

aspects, either continuing or breaking with established traditions. This chapter furthermore builds on the assumption, that re-design and transformation should be as simple as possible, to make such a transformation feasible, and therefore looks for common characteristics in the studied designs which facilitate the implementation of simple interventions to be able to share a dwelling. As such, it is the goal of this enquiry to explore a knowledge field complementary to existing disciplinary viewpoints on adaptation of the housing stock (which will be discussed in the following section). Moreover, it complements the social constructivist perspective elaborated in the discussion with inhabitants in the previous chapter, and which will be further elaborated by involving professional opinions in the subsequent chapters. The analytical, architectural line of thought that is worked out as stated below, searches for organisational patterns in the existing dwellings, which may be used to (re)integrate these buildings, in the societal and professional context, unveiling alternative possibilities of usage. As such, two complementary levels of thinking about technology are developed, involving on the one hand basic technical functioning of dwellings, and on the other hand the way such features may be appropriated in the Flemish culture of housing, building and planning.[8]

8. Here, a theoretical construction, elaborated by Andrew Feenberg, is followed. He explains how "the *functional constitution* of technical objects" is held next to "the realization of the constituted objects in actual technical networks (…)". Andrew Feenberg, "From Essentialism to Constructivism: Philosophy of Technology at the Crossroads," in *Technology and the Good Life?*, ed. by Eric Higgs, Andrew Light and David Strong (Chicago: the University of Chicago Press, 2000): 306.

9. Pascal De Decker, et al., *Ruimte Voor Wonen*, 9.

10. Dominique Vanneste, Isabelle Thomas, and Lieve Vanderstraeten, "The spatial structure(s) of the Belgian housing stock," *Journal of Housing and the Built Environment* 23, no. 3 (2008): 173-198.

Patching up the Flemish dwelling

The Flemish housing stock develops rather slowly, and increases with about 1,2% every year.[9] It is the historical result of a building industry with a strong focus on small project briefs, such as the single family dwelling. As a consequence, a large share of the housing demand is resolved by reusing existing buildings. Geographers Vanneste, Thomas and Vanderstraeten indicate that 9.8% of the housing stock in Flanders between 1991-2001 underwent renovation which included also a functional transformation by increasing the built surface or the number of rooms.[10] Such building processes most probably also include an improvement of the energetic performance. In line with acts of the

European Union, the Flemish government has been implementing increasingly strict decrees for the energetic performance of buildings, and extrapolates this development into the future.[11]

Adaptation of the older part of the housing stock in Flanders has already been extensively researched from the perspective of building physics. From this perspective, Griet Verbeeck and Hugo Hens state that, in order to decrease emissions of greenhouse gasses, the retrofitting of the existing housing stock is essential, in addition to the improvement of contemporary construction practice, and propose a prioritisation of interventions balancing economical investments and ecological revenues.[12] Such interventions mainly deal with the climate systems and the performance of the building envelope. For most dwellings in Flanders, brick walls are a main part of this envelope, with or (for older dwellings) without cavity.[13] Verbeeck and Hens argue that for dwellings that presently are not insulated, retrofitting should prove most beneficial, since a significant improvement may already be obtained just by providing insulation a couple of centimetres thick. In her doctoral dissertation, Karen Allacker states that the Flemish housing stock can be selectively optimized according to energetic demands using currently available technologies.[14] She rather states that this selection should occur based on age and location – stating that for dwellings built before 1970 (typically built without double glazing, or insulation under the roof or in cavity walls), demolition and new construction would result in a significant reduction of life cycle environmental impact, and that improvements to dwellings in remote areas could not compensate personal car mobility of the inhabitants.[15] Verbeeck & Hens and Allacker study prototypical Flemish houses and differ in their recommendations. The ongoing demographical development towards smaller households however adds a parameter to such equations, namely the potential the Flemish housing stock has for properly housing smaller, and older households.

11. VEA, "Vlaamse Regering Principieel Akkoord Met E70 Vanaf 2012".

12. Griet Verbeeck, and Hugo Hens, "Energy Savings in Retrofitted Dwellings: Economically Viable?," *Energy and Buildings* 37, no. 7 (2005): 747-754.

13. As is the case for the majority of the discussed sample.

14. Karen Allacker, "Sustainable Building: The Development of an Evaluation Method" (unpublished doctoral dissertation, KU Leuven, 2010).

15. Allacker, "Sustainable Building", 430.

Detached dwellings display a large variety in their outlook and spatial organisation, and are the result of a mix of individuality – because of personal choices, ad-hoc design & build decisions – but also commonalities, because of shared regional construction methods, building standards and cultural influences. Bartiaux et al., referring to the Belgian system in which many people build their own dwelling, argue that the individualistic characteristics have the overhand.[16] Furthermore, historically there has been relatively little construction and quality supervision exercised by the government, which results in varying quality levels of the built objects. Sociologist Stef Adriaenssens and mathematician Jef Hendrickx further emphasise that home maintenance and improvement in Belgium are performed within the informal economy to a level which is also relatively high compared to neighbouring countries; again, implying little supervision and diverse construction methods.[17] While there is also standardisation in building practice – we can mention for example turn-key projects or prefabricated dwellings[18] – these mass-produced dwellings also show variety; if it was the case that plans, unfitting for a certain site, were copied from another dwelling and implemented as such, obvious lack of quality (such as living rooms turned away from the backyard) has been remedied by inhabitants through transformation or addition to the dwelling – for example through adding a sun lounge, or by transforming the garage into a living space (**figure 43**).

The practice of re-use and architectural interpretations of flexibility

In this context, reconfiguration is considered to take shape as inhabitation of a typical *single* family dwelling by *multiple* households.[19] This option is commonly deemed appropriate for two households with a family relationship, of which one is in certain need of care, such as an elderly couple living together with the family of an adult child. Government regulations have been developed as a legal background for home owners and

16. Bartiaux et al., "Socio-Technical Factors Influencing Residential Energy Consumption".

17. Stef Adriaenssens, and Jef Hendrickx, "Choices in Threefold. Home maintenance and improvement between household production, informal outsourcing and the formal economy", (Brussels: Hogeschool-Universiteit Brussel, Faculteit Economie en Management, 2008).

18. See for example the discussion of the Danilith company, designing and building prefabricated dwellings in André Loeckx, "Wonen Uit De Fabriek. De Vele Levens Van De Bungalows Van Danilith-Delmulle," in *Wonen in Welvaart : Woningbouw En Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam, Antwerpen: 010/ Vai/ CVAa, 2006): 230-247.

19. This particular form of living together has been given attention in Flanders by governmental housing departments, social organisations representing the elderly and professional parties such as contractors developing cohabitation concepts, as an answer to the changing housing demands which emerge as a result of an ageing society.

developers to ensure that housing subdivision as such could occur. Procedures of municipal control are minimised so that only a declaration, not the application for a permit, has to be processed, as long as the transformation occurs within the built envelope of the dwelling and no structural changes are implemented. This is furthermore under the condition of demonstrating a certified need for care, a limited surface for the subsidiary unit, and the requirement to reincorporate the subsidiary unit into the family dwelling after the demand for residency and care disappear: as such, a certain flexibility is projected. Within these conditions, the bureaucratic process to create additional dwellings is rather uncomplicated compared to other legal processes structuring the creation of housing (see table 4.1). Another option would be a complete subdivision, creating two separate dwelling units; this is a more complex process: the application of such a project is held against allotment plans (which would probably need to be reviewed, as they usually are devised to allow only detached dwelling types in a certain neighbourhood), and requires a permit of the municipal spatial planning department; the newly created dwellings furthermore need to follow the contemporary energetic standards. In other words, it needs to be treated similar to a new construction project. In this case, a more complete separation needs to be implemented, providing each unit with the necessary amenities.[20] However, after succeeding this operation, both units are permanently split up.

20. Frouwke Bormans, Bert Van de Vijver, Grete Gysen, and Hilde Van Ransbeke, "Woningopsplitsing: Richtlijnen Voor De Kwalitatieve Opsplitsing Van Woningen in Meerdere Wooneenheden", ed. by vzw Stebo (Hasselt: Provincie Limburg, 2011).

The following analysis of detached dwellings takes into consideration both transformation pathways (**figure 44**) and how these may be implemented with simple means. In order to test the potential of the building stock, the adaptability within the dwelling itself is tested, without resorting to expansion of the built volume. The first kind of adaptation foresees a rather temporary subdivision which facilitates the sharing of a dwelling between a care-giving and a care-demanding household; the second kind, a more permanent subdivision, transforming one large dwelling into

two smaller units, designing both units to have equal qualities in terms of space, accessibility and relation to the lot.

Typically, detached dwellings are designed for one single function, being inhabitation by a nuclear family. If such dwellings are inhabited by smaller households, housing literature speaks of *under usage* of a dwelling or *overhoused*, or *overconsuming* inhabitants.[21] Hypothetically, this oversize of Flemish houses already implies certain potential for flexibility as to how and by how many the building can be inhabited. Since the focus is narrowed down to the detached dwellings, demonstrating reoccurring characteristics, which are however interpreted by the owner-builders in a myriad of ways, the concept of flexibility requires appropriate framing. In order to consider potential for flexibility in these dwellings, a methodology of distilling common characteristics, adapted to this specific regional situation, needs to be elaborated, along with a more precise concept of how the terms *flexibility* and *adaptive re-use* need to be interpreted.

Aiming for a change in the Belgian mode of housing production, Vandevyvere and Verbeeck plea for attention for such flexibility, urging architects to design robust and reinterpretable structures, combined with reusable and demountable building parts for short-term use.[22] But is a very resilient and defined existing house capable to undergo a transformation which, in the words of James Douglas[23], prepares for "other, more effective and efficient uses" meaning a better fit with user requirements and an extended lifetime, which defines adaptive re-use?

Architectural historian Adrian Forty explains the interest of modern architects to relate architectural conception more strongly to the processes of use and occupation, and argues that flexible design is one approach to do so.[24] An example of a very technical, designer-imposed form of flexibility would be a building based on moveable screens or walls, used to compartmentalise spaces.

21. William A.V. Clark, and Marinus C. Deurloo, "Aging in Place and Housing Over-consumption," *Journal of Housing and the Built Environment* 21, no. 3 (2006).

22. Vandevyvere and Verbeeck, "Duurzaam bouwen en wonen", 157.

23. James Douglas, *Building Adaptation, Second Edition* (Oxford: Butterworth-Heinemann, 2006), 146.

24. Adrian Forty, *Words and Buildings, A Vocabulary of Modern Architecture* (London: Thames & Hudson, 2000).

Architectural theoreticians Jeremy Till and Tatiana Schneider do not place the concept exclusively with the designer. They distinguish between hard use and soft use - the former being flexibility designed by the architect, thus offering a limited number of options to the user, while the latter proposes flexibility which empowers the user to influence the design during the lifetime of the dwelling.[25] They further define flexible housing as "housing that is designed for choice at the design stage, both in terms of social use and construction, or designed for change over its lifetime".[26] Architect and theoretician Bernard Leupen, in his dissertation on flexibility and permanence of buildings, reasons that especially the part of a building which is permanent, the *frame*, is essential in organising this changeability.[27] He defines the frame not just as the assemblage of structural elements, but argues that it also may be composed of other architectural qualities and elements, the values of a building which are appreciated in society and which stimulate adaptive re-use. This frame leaves space to interpret buildings as flexible, by analysing how it may be appropriated by users in other ways, while the building itself may not have been built with flexibility in mind: flexibility is not incorporated in the design itself, but may be discovered during or after the first period of usage.

The concept of the *frame* as proposed by Leupen thus allows to project different concepts of flexibility on different buildings. As was discussed above, Flemish dwellings show generic typological trademarks but also specific traits; this hinders making a generic statement on adaptability beyond the particularity of single cases. Hence, this enquiry looks for indicators of flexibility, and due to the specific topic, also looks for an appropriate understanding of flexibility.

Modelling and abstraction in science and in design practice

In order to elaborate this analysis, a conception of a building frame is developed, in order to provide the means for determining

25. Jeremy Till, and Tatjana Schneider, "Flexible housing: the means to the end," *arq - Architectural Research Quarterly* 9, no. 3/4 (2005): 287-296.

26. Jeremy Till, and Tatjana Schneider, "Flexible housing: opportunities and limits," *Arq - Architectural Research Quarterly* 9, no. 2 (2005): 157-166., 157.

27. Bernard Leupen, *Frame and generic space* (Rotterdam: 010 Publishers, 2006).

common denominators from a sample of detached dwellings, which are valid for a significant part of the housing stock. This enquiry on a generic level involves operations which are derived from the design process, such as a solution focused analytical process, as designers would incorporate in their working method on a case-specific level. This design process is coupled with another process, geared toward the creation of scientific concepts. Nancy Nersessian, a cognitive scientist focusing on creativity and conceptual change, discusses problem solving as a process in a scientific context which involves the creation, manipulation, evaluation and adaptation of mental models in order to come to conceptual innovation.[28] A similar process is proposed by philosopher Michael Weisberg, and constitutes of three steps; primarily, the construction of a model; secondly, the analysis and refinement of this model; and thirdly, assessing the relationship between the model and the real world.[29] A model, in the context of this enquiry, would be the description of a dwelling type in terms of a critical selection of characteristics, indicative for flexibility in the light of a sensible plan for adaptive re-use.

The iterative processes of constructing and refining representations is a process which transcends the boundaries between architecture, science and engineering. By means of representing models with imagery, unknown or overly complex factors are factored out, in order to retain only those characteristics related to the problem in need of solving.[30] Classical examples of such models from science are the helix representing DNA structures, or depictions of neutrons, protons and electrons illustrating atomic theory. Such representations most often take shape as diagrams, artefacts used for communication and explanation within a certain community, or to make certain concepts transferable between different communities,[31] and moreover as tools for "facilitating reasoning through interplay with mental models to which they have (such) correspondences".[32] Such diagrams are product of a selective and creative process of *abstraction,* resulting in a simplified problem

28. Nancy J. Nersessian, *Creating scientific concepts* (Cambridge, MA: MIT press, 2008), 131.

29. Michael Weisberg, "Who is a Modeler?," *the British journal for the philosophy of science* 58, no. 2 (2007): 207-233.

30. Nersessian, Creating Scientific Concepts, 151.

31. Nancy J. Nersessian, "Abstraction via generic modeling in concept formation in science," *Mind & Society* 3, no. 1 (2002): 129-154.

32. Nersessian, Creating Scientific Concepts, 161.

definition, and a representation supporting computation or decision making processes.[33] Nersessian discusses how a process of establishing a representation of what is common in a system or a set of phenomena (and as such looks for common denominators) leaves differences out of the equation: this process is therefore termed *generic modelling*.[34] In the context of the current study of Flemish detached dwelling types, abstraction is put forward as an instrument for reviewing the stock of detached dwellings in its entirety in order to enquire into the feasibility of transformations on the basis of such generic characteristics. The connection between creativity and analysis provides a framework to explore the combination of generic/scientific and specific/designerly perspectives with regard to this stock of dwellings. Especially for the typical dwelling in Flanders, which was analysed as customized (specific) variations on common regional (generic) concepts, abstraction is a useful tool to distinguish which of these commonalities are relevant with regard to adaptive re-use.

Therefore an exchange between mimetic (designerly) and analytical (scientific) perspectives is proposed here: the rigor of science is paired with design creativity and representation, in order to investigate a complex problem which specifically relies on this disciplinary interaction in order to come to relevant conclusions.[35] Dogan and Nersessian link abstraction to the creative processes of designers by means of a cognitive-historical analysis of specific design histories. Based on a study of the design processes of the architects James Stirling (discussing his project for the Neue Staatsgalerie in Stuttgart, finished in 1984) and Daniel Libeskind (discussing the design of the expansion of the Jewish Museum in Berlin, finished in 1999), they state that abstraction delimits the scope of variations on a core concept during the explorative first stage, structuring and propelling the design process in which the central idea is elaborated into a more concrete physical solution.[36] Furthermore, the construction of this model involves problem defining aspects – which can be called a scientific scope – and

33. See: Nersessian, *Creating Scientific Concepts* ; Nancy J. Nersessian, "Model-based reasoning in conceptual change," in *Model-based reasoning in scientific discovery*, ed. by l. Magnani, N. J. Nersessian and P. Thagard (New York: Kluwer Academic/Plenum Publishers, 1999): 5-22; Michael Weisberg, "Three kinds of Idealization," *The Journal of Philosophy* 104, no. 12 (2007): 639-659.

34. Nersessian, "Abstraction Via Generic Modeling in Concept Formation in Science", 148.

35. See chapter two of this dissertation.

36. Femi Dogan, and Nancy J. Nersessian, "Generic abstraction in design creativity: the case of Staatsgalerie by James Stirling," *Design Studies* 31, no. 3 (2010): 207-236; Femi Dogan, and Nancy J. Nersessian, "Conceptual diagrams in creative architectural practice: the case of Daniel Libeskind's Jewish Museum," *Arq - Architectural Research Quarterly* 16, no. 1 (2012): 14-27.

problem solving aspects – which can be called a design scope.[37] Instead of focusing on just one of these scopes, a continuous exchange between the problem space and the solution space, a common characteristic of design progression, is incorporated.[38]

In architectural theory, analytical diagrams of architectural objects have been published, most notably by architectural historian Rudolph Wittkower,[39] documenting similarities in geometrical concepts in the oeuvre of the 16th century Italian architect Andrea Palladio. Wittkower's apprentice, Colin Rowe, continued this by analysing the work of Palladio and Le Corbusier. He has asserted a relation between classical and modern architecture by proving similarities in architectural organisation and proportion, while following differing structural principles.[40] These analyses, according to architectural theoretician Anthony Vidler, are at the root of the influence abstract diagrams have on the design methods of contemporary avant-garde architects.[41] He sees such diagrams as a red line throughout architectural history, which emphasises the importance of organisation and rationality, and shrouds representation, ornamentation and nostalgia. Antoine Picon even explains the contemporary interest of avant-garde architects in diagrams as an emulation of scientific processes.[42] Picon argues that architectural offices, such as the Amsterdam-based UN Studio and Rotterdam-based MVRDV, propose diagrams as rational, data-based tools for decision making, however neglecting social (or designerly) construction of paradigms and results, as is common in science. The method of representation proposed here, combining design heuristics and analysis in the production of schematised drawings of plans and elevations, allows for comparison of selected parameters. It is appropriated with the finality to search for indicators of re-design flexibility, and fully acknowledges this design-oriented, social construction of results.

Existing diagrammatic systems have been established to suit an analytical goal, and respond to the technical standards of the

37. Nigel Cross, "Designerly Ways of Knowing: Design Discipline Versus Design Science," *Design Issues* 17, no. 3, summer (2001): 49-55.

38. Such exchange is theorised in: Kees Dorst, and Nigel Cross, "Creativity in the design process: co-evolution of problem-solution," *Design Studies* 22, no. 5 (2001): 425-437.

39. Rudolf Wittkower, "Principles of Palladio's Architecture," *Journal of the Warburg and Courtauld Institutes* 7, (1944): 102-122.

40. Colin Rowe, *The Mathematics of the Ideal Villa and Other Essays* (Cambridge: MIT Press, 1982).

41. Anthony Vidler, "Diagrams of diagrams: architectural abstraction and modern representation," *Representations*, no. 72 (2000): 1-20. Vidler refers to the a broad selection of contemporary architects, which have appropriated diverse interpretations of the diagram: such as the extensive processing of relevant data in a design diagram, digitalised diagrams which describe complex geometries, and diagrams which are almost literally constructed to obtain abstract architecture.

42. Antoine Picon, "Architecture, Science, Technology, and the Virtual Realm," in *Architecture and the Sciences: Exchanging Metaphors*, ed. by Antoine Picon and Alessandra Ponte (New York: Princeton Architectural Press, 2003): 292-313.

particular time. The drawings which were made by Wittkower and Rowe, for example, demonstrate geometrical patterns, and as such are diagrams of the built structure in which the line of the facade and structural walls may be recognised, sometimes also the location of staircases, while other architectural characteristics are reduced or removed. Architectural theory revolving around transformation and flexibility, has provided plural analytical instruments, allowing to investigate buildings by isolating several building layers. Among the most recent ones, and incorporating contemporary (late 20th century) building standards, is the system proposed by biologist, designer and futurist Stewart Brand. Brand proposes a categorisation of 6 layers, generally applicable for building analysis[43]: site, space plan, services, skin, structure, and site. Leupen, in his turn, develops a categorisation fit for his own research purposes (focusing on a broad selection of housing projects) which excludes site and stuff – these categories are considered 'non-architectural' – but includes circulation.[44] In summary, these concepts categorise architectural elements, be it in different ways.

In the case at hand, design concepts of adaptive re-use are projected to build, test and adapt a model in this explorative phase. This can be seen as a heuristic process, based on architectural rules of thumb[45] which is not applied to propose final and definitive solutions, but to generate information on the characteristics of the housing stock, which could be incorporated both in abstract, generalized output as in further elaboration of specific, local design assignments. Modelling, by means of abstraction, is suitable to discover in a sample of buildings generic characteristics which could be reinterpreted by designers when developing concepts for adaptive re-use. Given the fact that the sample of dwellings shows many common characteristics, which recombine in different manners, the approach of a *Multiple Model Idealisation* as discussed by Weisberg[46] is followed; distinct indicators are developed and considered separately. This independent categorisation allows to

43. TThis general categorisation is based on an earlier system proposed by Frank Duffy, especially meant for analysis of office buildings. Frank Duffy, The Changing Workplace (London: Phaidon, 1992). Quoted in: Stewart Brand, How Buildings Learn (London: Penguin Books, 1994).

44. Leupen, *Frame and Generic Space*, 31.

45. See Bryan Lawson, *How Designers Think* (London: Architectural press, 1980); Michael E. Gorman, and W. Bernard Carlson, "Interpreting Invention as a Cognitive Process: The Case of Alexander Graham Bell, Thomas Edison, and the Telephone," *Science, Technology & Human Values* 15, no. 2 (1990): 131-164.

46. Weisberg, "Three Kinds of Idealization".

recognise common denominators (reoccurring characteristics), in dwellings, and leave differences out of the equation in order to make a comparison. In a evaluative step after the abstraction, the possibility of recombining the models will be discussed.

47. For an overview, see appendix 3. The houses were coded H_01 to H_65, following the chronology of home visits.

Defining categories for analysis

The 65 dwellings in low-density neighbourhoods in Flanders which were visited and documented are at the basis of this analysis.[47] These houses were constructed in the 10 case study municipalities, which were selected because of the significant representation of detached dwellings in the housing stock. This dwelling sample – although limited to detached dwellings – is a random selection based on effective participation of the respective inhabitants. The documentation of the dwellings was done by photographing the existing building plans, photographing the building, making sketches and notes of the house, and discussing a short list of questions about the building state, the applied construction methods and materials. These data were processed in standardised drawings, using one uniform scale and drafting style, which make the dwellings comparable – this was done with CAD software. The basic drawings were refined into a set of analytical drawings, which form the analytical basis of the modelling process. These representations were produced both by means of CAD software and by means of hand drawing (sketching). Each drawing was made with the aim to isolate a specific topic for abstraction, which entails a purposeful emphasis on select spatial characteristics, combined with an exclusion of details. Hence, this analysis builds upon the geometric studies most commonly used in architectural theory of Wittkower and Rowe as discussed above.

Of the total sample, 6 dwellings have been excluded from this analysis, because the fieldwork delivered incomplete data for a correct drawing (for example if the existing plans proved to contain incomplete information, if there were no plans at hand, if night-time darkness inhibited the photography, or if the visit

was ended prematurely). A further reduction of the sample up for consideration is based on the surface analysis of the 59 remaining dwellings, distinguishing the total surface of living spaces, which are the living rooms, bedrooms, kitchens and home office rooms, but excludes other parts of the useable surface such as sculleries, hallways, bathrooms and in-built garages. This categorisation follows the Belgian population and housing census, which was last held in 2001 and which resulted in a national housing monograph.[48] The living surface of the dwelling sample studied in this research ranges between 65,4 m² and 289,0 m². Gross surfaces were measured between 126,1 m² and 775,0 m². To consider the dwellings which are most adaptable, the largest distinguished category in the monograph was taken as the category which would have the most potential and necessity to be considered for adaptation, and this category consists of dwellings with at least 125 m² of living spaces. In our sample, there are 42 dwellings within this largest category. This amount of space would hypothetically imply a level of flexibility to implement other forms of usage; moreover, these dwellings are most incongruent with contemporary developments towards smaller housing units.

A set of three abstractions was developed as a selection system to isolate qualities indicating flexibility. This selection system involves two subcategories per abstraction, each combining certain building layers. Table 4.2 gives an overview of the structure of these abstractions, as well as the building layers, as proposed by Steward Brand, which are involved per abstraction.[49]

Figure 45 illustrates the three resulting abstraction processes based on one house. This approach has been developed to determine how oversize concretely takes shape in the stock of detached dwellings, and what potential this holds for dwelling adaptation, taking into consideration additional oversize in between the gross and the net surface of primary living spaces. Primary spaces, like living rooms, kitchens, bedrooms and home offices, are as such categorised as

48. Dominique Vanneste, Isabelle Thomas, and Luc Goossens, "Woning En Woonomgeving in België", (Brussels: FOD Economie, KMO, Middenstand en Energie, Algemene Directie Statistiek en Economische Informatie, 2007).

49. Stewart Brand, *How Buildings Learn*, 13.

Table 4.1:three abstractions and six subcategories

abstraction	**subcategory**	**Building layers** (Brand, 1994)					
		site	structure	skin	services	space plan	stuff
1. Served spaces	*A. Organisation and orientation*	▪				▪	
	B. Structural hierarchy		▪	▪			
2. Servant spaces	*A. Dimensions and functionality*		▪	▪	▪	▪	
	B. Distribution of functions in the dwelling		▪		▪	▪	
3. Circulation spaces	*A. Complexity of main circulation system*	▪				▪	
	B. Horizontal and vertical circulation		▪	▪		▪	

topic for the first model. To include also the oversize which is materialised in the entire dwelling, we borrow the distinction between *served space* and *servant space*, which was conceived by the American architect Louis Kahn as an organisational principle in his design practice.[50] The organisation of these servant spaces, is further subdivided in functional servant spaces, like garages, storage spaces and bathrooms, which form the second abstraction, and the organisation of circulation spaces, like hallways and corridors. This third abstraction deals with movement through the dwellings, and looks at the systems which organise *circulation and access* through the house.[51]

Differing from the building samples studied by Brand and Leupen, which show a typological broadness, the sample at hand, consisting solely of detached dwellings, is typologically rather narrow. Most importantly, since large (even oversized) detached dwellings are studied, these diversities are found in the way space is organised and proportioned. Consider the following comparison

50. Alexandra Tyng, *Beginnings: Louis I. Kahn's Philosophy of Architecture* (New York: John Wiley & Sons, 1984).

51. According to the theory developed by Louis Kahn, circulation spaces are part of the servant spaces; In this context, they are considered separately.

of three dwellings (**figure 46**). These buildings are placed in a similar way in their lot (according to the prevailing allotment regulations), and were constructed with similar facades, building systems, and a structural system of parallel bays. The way these bays are proportioned, however, organises space in different ways. Within the sub-typology of the Flemish detached dwelling, these building elements recombine in many ways, as a result of the intricacies of the Belgian building tradition. This is addressed with the proposed set of abstractions comparison, which take into account the more subtle diversities among these dwellings. A selective involvement of the architectural categories defined by Brand is proposed – in general for all abstractions, but also some architectural elements are more important in one abstraction than in the other. At the level of each abstraction, an analysis is made of how these building elements define and organise these spaces. Analysis in terms of these topics led to the isolation of typological characteristics which indicate a certain potential for flexibility, which is interpreted as the possibility to functionally redefine spaces and to reorganise functions within the dwelling. The major ones were formulated as subcategories, two for each abstraction. Hence each subcategory discusses an interaction between a selected set of building elements, and how these define a group of spatial functions (served, servant, and circulation spaces). The subcategories will be further explained in the subsection for each abstraction.

Brand's category dealing with the furniture (*stuff*) is excluded from this modelling process which is focused on principles of architectural organisation. The *skin* is considered a categorisation pertaining strongly to the previously referred analyses of building physics; for this investigation, the emphasis is placed on organisation to determine which dwelling could be ascribed a surplus value, which makes it more feasible to improve the building shell. That is why the skin is mainly dealt with as a part of the *structure*. The *site* is also dealt with in limited terms: here, it

is treated as a topic of architectural interest, as the site determines strongly the way living spaces are organised and oriented. The concept of structure is an aspect which is incorporated in all three abstractions. Structural logic strongly determines the flexibility of the building in technical terms, as it determines the size, proportion, and changeability of the spaces. Dwelling structure was analysed in geometrical terms, focusing on a distinction between main load bearing walls, columns, structural beams, and overhangs – which either coincide with the building skin or are placed within the interior – and non-load bearing walls, which pertain to the *space plan* and can be changed more freely. The space plan is another concept which returns throughout all three abstractions. The first and the third abstraction also involve aspects of the site, which determines the orientation of living spaces and the organisation of circulation spaces respectively. The second abstraction distinguishes itself by the involvement of the concept of services, such as bathrooms and the location of heating equipment. Kitchen spaces are dealt with as served spaces, because kitchens are considered living spaces in the census, and are often closely related to the main living room.

Abstraction 1: served spaces

This abstraction aims to shed light on design constants with a focus on organisation and orientation of primary living spaces. A study of the plans gives insight into the relation primary spaces have with the ground level, and between each other. It reveals information about spatial quality –such as the height of spaces, and whether the roof structure limits this height – and the relation between primary spaces vertically.

1 A. Proportion, organisation and orientation

For each dwelling, the basic organisation scheme formulates a response to a site with a specific orientation and topography. Especially spaces such as the living room and the kitchen usually have a distinct orientation, allowing for a qualitative entrance of light and a direct relation to outdoor spaces, such as the front and

back yard. Typically, private living spaces, like bedrooms, have a less strong relationship with the outside. Dwellings which are characterised by two stacked floors, with the main living spaces downstairs and (most of the) bedrooms upstairs, under the roof structure with limited light access, display a strict translation of function into aspects of lighting and orientation. Similarly, bungalow types have bedrooms which are organised on a less attractive side of the volume: with a view of the neighbouring dwelling, or facing north. This functional logic (rooms strictly used for sleeping obviously do not need that much light) limits the possibilities of adapting the functionality of such rooms. From the dwelling sample emerge a number of buildings, in which this functional dividing line is less strict, because the bedrooms are orientated towards multiple directions, and have sizeable windows. **Figure 47** and **figure 48** demonstrate this concept: dwelling H_51, organised in two stacked floors, has bedrooms which face southward, like the main living spaces below. Dwelling H_02 shows a strict division between well-lit living spaces, with large windows opening up to the garden, and smaller sleeping quarters which are defined by their proportion and orientation, facing away from the centrality of the backyard. Even thought this is a bungalow, where all sleeping quarters are in the ground floor, this orientation impedes redefining the functionality of the main living spaces. Another aspect considered to contribute positively to reconceptualising flexibility, is the situation when rooms designated as sleeping quarter or living quarter, are organised across different zones of the dwelling. Imagine for example a house with bedrooms on the ground floor as well as on the first floor, or with additional living spaces on the first floor, such as illustrated in **figure 49**.

1 B. Structural hierarchy

The height of the ceiling of bedrooms on the first floor of a house is most commonly less than the height of other living rooms; also bedrooms are often partially limited in height by the roof structure.

This illustrates one aspect of how primary spaces are proportioned by the structural system. Four basic structural systems can be recognised (**figure 50**); a hybrid between two of these systems is furthermore possible in the case when buildings have been expanded in the past. The first structural system defines dwellings organised within a single, rectangular volume with a clear geometric pattern as a basis for the construction. Most commonly, this type manifests itself as a regular bay structure, built up with constructive, parallel walls on which the floor slabs are placed, with lighter secondary walls without a load bearing function. In a more complicated version of this basic type, the construction is adapted to allow for a larger difference between different spaces for different functions. Beam structures allow large open spaces for the living room, while smaller back rooms and garages are compartmentalized. The third category is similar to the second one, with the difference that the structure does not make up a rectangular plan, but a complex configuration of volumes, defining the organisation of the rooms within. A fourth category adds the complication that some buildings have a facade system and a construction system which do not match completely, for example when load-bearing columns are places outside of the facade, or an overhang is part of the structure. Structures which limit the floor height of living spaces, and with an irregular division, are considered as suboptimal with regard to dwelling transformation, as the functional layout of the dwelling is ‘cast in concrete’; there is a clear differentiation between the main living room, which is made as big as possible by means of beam constructions, and as such represents a significant part of the liveable space, and the smaller living (or secondary) spaces, which are divided by structural walls. Hence, in this analysis, the conception is followed that a regular system allows for more neutrality, and flexibility, than a very irregular structure; the structural system of dwelling H_62 in **figure 49** shows how the two floors of this dwelling may be divided in equal ways, resulting in two stacked units, both with smaller and bigger rooms. This focus also involves the

compactness of the building: a compact volume is more beneficial in terms of building physics. Most ideally, the first and second structural category – composed of regular geometries – facilitate a functional reconfiguration of the dwelling.

52. Such as Vanneste, Thomas, and Goossens, "Woning En Woonomgeving in België".

In summary, **figure 51** categorises dwellings which demonstrate a functional organisation which could serve functional exchange among the diverse living spaces. These dwellings lack however a sensible structural system, which the dwellings grouped in **figure 52** do display. Her, both single floor and multiple floor dwellings are grouped together. For the single main floor type, two cases illustrate a structural organisation which allow for equal proportions shared between both living rooms and bedrooms. **Figure 53** groups together the dwellings which fall under both subcategories, and represent the most flexible conditions according to this abstraction of served spaces. The conclusion can be drawn that subdivision is most feasible for dwellings which display a certain symmetry, in terms of orientation, organisation through the building, and proportion. This symmetry allows for spaces to be reinterpreted and appropriated by different functions: the implementation of a subdivision can be done while safeguarding spatial qualities (access to outside spaces, lighting, view, useable proportions of spaces) for both units. Dwellings which are organised according to a certain asymmetry, as a result have spaces which are rather specific than generic, and resist alternative usage.

Abstraction 2: servant spaces

Different forms of organisation take in different measures of space; some dwellings are built more efficiently than others. While the previous abstraction focused on living quarters, and as such interprets the spatial dimensions which are documented in socio-cultural.[52] This perspective on space needs elaboration, since another kind of oversize becomes apparent in dwellings which are built with many, and with sizeable, servant spaces. This second abstraction relies on the relation between the floor area of

living spaces and the total useable space. The total useable space is an interesting numeral, because it distinguishes surfaces within the built volume which have similar conditions like served spaces (in terms of accessibility, heating and insulation) from the gross surface.[53]

2 A. Dimensions and functionality

One group of dwellings demonstrates a significant presence of secondary spaces which has potential for being converted in living space. Such space is mostly given form as in-built garages, which are included in the primary building skin, and as such can be made accessible easily. The garages have been designed for cars, but in everyday life, have been appropriated by different members of each household for completely different purposes.[54] As such, a transformation of this space in functional terms is not so strange. Such a garage would be transformed in relation to the dwelling itself most efficiently, in the case these are found on the ground floor level, closely connected to living spaces, and without limitation in free height because of a roof structure. Most feasible in energetic terms, are garages which are incorporated in a compact volume; also, the placing of heating equipment in separate spaces allows for a realistic re-appropriation. **Figure 54** and **figure 55** illustrate the difference between two dwellings, both with a relatively large gross surface in comparison to the living surface; the former one is a dwelling with diverse servant spaces occupying the useable surface, while the latter one has a significant proportion of its servant spaces organised in the basement, hence unsuitable for a functional change. In some cases, these garages are clustered with working spaces or workshops and form a significant volume, as illustrated in **figure 56**. The presence of large additional volumes, rather provides the opportunity to detach these volumes without changing the core dwelling, and converting these into an additional dwelling unit. For attics, the building structure and skin determine whether the spaces have enough height to project a living quarter; however, proper lighting and qualitative access to outside spaces

53. Useable space is calculated by taking the Gross surface and deducting space in unheated basements, inaccessible attics and floor area where the net height is less than 1 meter 50. Dwellings with little surplus demonstrate a balance of living area : useable are of 1: 1,4 while less efficient building demonstrate a balance of 1: 2 and over. The useable space includes the surfaces taken in by structural elements such as walls. See VEA (Flemish Energy Office), "Veelgemaakte fouten in EPB Aangiften", Vlaams ministerie van Leefmilieu, Natuur en Energie, (2010). <http://www2.vlaanderen.be/economie/energiesparen/epb/nb1004/annex2veelgemaaktefouten.pdf> [Accessed 31 October 2013]. Also see appendix 3 for an overview of calculated surfaces.

54. Els De Vos, and Hilde Heynen, "Uncanny and In-Between: The Garage in Rural and Suburban Belgian Flanders," *Technology and Culture* 52, no. 4 (2011): 757-787.

are more difficult to realise. Dwellings which are organised with inclusion of such spaces, are easily recognised in a comparison of the surface of living spaces with the total useable floor area.

2 B. Distribution of functions in the dwelling

Services such as heating do not need to be doubled to service both households, as long as technical spaces are easily accessible for each household. A kitchen could be provided, but examples of cohousing projects also demonstrate the option of sharing a cooking space. These aspects depend on a specific project brief. Sanitary spaces provide a lead towards a subdivision project, as they are often already doubled in the studied sample of dwellings. Alternatively, many dwelling have on their ground floor a scullery or washing place, which could be refurbished into an additional bathroom. **Figure 57** shows the example of dwelling H_26, demonstrating how clustered servant spaces are organised according to structural and organisational logic, above one another. Alternatively, bathrooms may be situated on one floor, but divided into different structural bays, as is the case for dwelling H_17 (**figure 58**). Each situation offers different potential for subdivision: the presence of sanitation on all floors facilitates an accessible accessory apartment, while in the cases where bathrooms are divided among structural bays, this facilitates a vertical subdivision in accordance with the structural system. **Figure 59**, on the other hand, demonstrates the opposite: a dwelling with one bathroom, and a scullery; this scullery however doubles as a circulation space, which obstructs redefining it. **Figure 60** gives another example of a configuration resisting subdivision, for a large bungalow type dwelling, with one single decentralized bathroom.

Summarising this abstraction process, a concentration of servant spaces may facilitate a separation from the main dwelling. The organisation of services in the dwelling determines what kind of subdivision is possible, and to what level the two resulting housing units will remain connected. **Figure 61** shows the

subcategory of dwellings with a well-situated servant spaces, or cluster of spaces, and with separate spaces for heating equipment (such as basements). **Figures 62** and **63** show dwellings with well-distributed bathrooms. **Figure 64** demonstrates the 8 dwellings which are part of both subcategories.

Abstraction 3: circulation spaces

The abstraction of circulation through the building is essential in determining how the connection between different spaces is organised, and to determine what opportunities there are to reorganise this circulation. The two proposed subcategories look for the circulation systems which contribute to a concept of flexibility, and the structural qualities which could be used as a motive in proposing a housing transformation.

In order to build this abstraction further, reference is made to the study of built space by Julienne Hanson and Bill Hillier at the Bartlett, University College London, in which the relation between built configurations and social patterns of usage is enquired into.[55] This is done by comparing different buildings constructed within one cultural and temporal framework, and deducting configurational similarities and dissimilarities. The physically built patterns are linked to social and behavioural patterns. In order to establish such a delineated comparison, built structures are abstracted by means of "justified access graphs",[56] which reduce the building to a set of dots representing rooms and connecting lines representing accesses between rooms and between the rooms and the exterior. Such diagrams are taken as separate representations of a building by scientists using the *space syntax* method, and are compared as such. In the context of this enquiry, such schemes are projected over a basic drawing which also shows the proportion and orientation of the spaces involved, in order not to lose too much information necessary for making design decisions. This also places the functional *dots* in a spatial logic; this prohibits confusion since justified access graphs are

55. This concept was named Space Syntax, see Julienne Hanson, *Decoding Homes and Houses* (Cambridge: Cambridge University Press, 1998); Bill Hillier, "Space is the machine: a configurational theory of architecture", (London: Space Syntax, 2007).

56. Hanson, Decoding Homes and Houses, 23.

abstracted to such a level, that these schemes can be manipulated by varying the length of connections or the positioning of dots, depending on which space the analysis is started from.[57] It furthermore facilitates a comparison between the complexity of the circulation system with the building elements that materialise this system.

57. Hanson, Decoding Homes and Houses, 26-27.

3 A. Complexity of the main circulation system

This approach to abstraction of circulation spaces forms the first subcategory of this abstraction, and leads to the recognition of three basic systems. The first system is composed of a central circulation space which gives direct access to a number of quarters, as well as access to the staircase leading up to the first floor if this applies. The second system is a linear system, in which the entrance hallway gives access to one single space, from which one can go into another room and so on. The third system is a circular one, which is basically a combination of the two previous ones, with doors between quarters and a central circulation space which allow one to walk through the rooms in a circular movement. These two latter system imply that living quarters, besides their primary function, also serve as circulation spaces, which is not so for the first system. Looking at the systems separately, each one requires different conditions when considering subdivision of the dwelling. A central distribution space needs to have proportions allowing to subdivide this space. A linear system usually arranges the spaces according to a gradient from more representative towards more private. Such distribution is more difficult to subdivide and depends strongly on the distribution of functions such as bathrooms, toilets and bedrooms throughout the dwelling. For a circular system, this is also valid, however, here there are different access methods which would allow a designer closing off some routes to reinstate a double circulation system.

In most analysed cases, the dwellings however function on the basis of hybrid systems; the circulation through the dwelling is

organised by means of a combination of two or more occurrences of the abovementioned primary systems. While the central system typically organises access in the more private sleeping areas, the living areas of detached dwellings are serviced by all three systems. Three cases illustrate how these categories combine, and how the living area is mainly organised by one dominant system. The least complex cases combine one system for the living zones with one system for the sleeping area (which is usually a central distribution system). **Figure 65** shows how two central circulation systems (each on one floor) are linked together by means of one, central circulation space. **Figure 66**, in comparison, combines a linear system for the ground floor with a central system for the first floor. This leads to a sequence of served spaces, servant spaces and circulation spaces which is hard to unravel for a potential subdivision. More complex dwellings (such as illustrated in **figure 67**) combine multiple systems in their living zone, which occasionally have a separate access space to the outside (either a front door, a backdoor or a garage door); a limited number of dwellings also access the outside on the first floor by means of a balcony or a terrace. If a dwelling demonstrates three or more of the discussed circulation systems, it is considered as a complex composite in the context of this research (this is the case for 21 of the 42 scrutinized houses). Such complex systems offer more opportunities for reorganisation, since partial systems can be separated from the overarching system, leaving it less complex but still functional.

3 B. Horizontal and vertical circulation

The increasing complexity however also coincides with structural complexity. In addition, a significant aspect in such complex systems is how served spaces and circulation spaces interact. A certain distinction between both spatial systems is necessary to project a potential subdivision. Dwellings characterised by a spatial concept which closely links together living spaces – by means of a split-level organisation or double-height spaces for

example – and living spaces spreading out across different floor levels make subdivision overly complex. A dwelling such as H_43 (**figure 68**), can be defined as exemplary of a *raumplan typology* using the concept introduced by the early 20th century Austrian architect Adolf Loos.[58] In such a concept, spaces are divided from one another by these subtle height differences, but still have a perceptual relationship.

Looking in close detail at dwellings with composite circulation systems, qualities of the structure and the space plan can be recognised which organise this complexity and provide a basis for potential subdivision. Here, an efficient organisation and materialisation of circulation spaces, both in vertical and in horizontal terms, come to the fore. In horizontal terms, dwellings with multiple circulation spaces can be discerned. In general, a distinction in a *front stage* circulation space (the main hallway where the front door is) and a *back stage* circulation space, such as a secondary hallway with a backdoor entrance,[59] allows a designer to develop a subdivision with circulation space as a main generator. These different passage spaces connect representative living spaces to the more private sleeping area or to secondary spaces like sculleries and garages. These spaces are in some cases organised in a structurally defined zone, which organises a double access to the outside, as is illustrated in **figure 69**. As such, these configurations open up the opportunity of facilitating different entrances to different units. Secondly, a spaciously organised entrance hall with a double height or a large void, which is structurally defined in a clear way within one single bay, is considered an opportunity for a combined access. This facilitates a vertical subdivision, by means of the placement of a second staircase without heavy demolition work, changing the structural system, to divide the dwelling vertically (**figure 70**). Another structural aspect facilitating subdivision is when a second staircase is already present, as is illustrated in **figure 71**.

58. For an extensive discussion of the work of Adolf Loos, see Max Risselada, ed., *Raumplan Versus Plan Libre: Adolf Loos [and] Le Corbusier* (Rotterdam: 010 Publishers, 2008).

59. De Vos and Heynen, "Uncanny and In-Between": 780.

60. Weisberg, "Who is a Modeler?"

61. Weisberg, "Three Kinds of Idealization": 658.

Figure 72 and **figure 73** demonstrate how dwellings pertain to either one of the two discussed subcategories. The largest sample is grouped in the category combining both subcategories, indicating a strong interdependence between the two subcategories (**figures 74** and **75**). This indicates a continuity with regard to subdivision, which may be facilitated by two interrelated aspects of the circulation system: a complex system, comprising of several subsystems which may be disentangled and made operational on their own; plus structural dimensions and organisation which allow for this disentanglement. This means that the existing circulation space needs to be generously dimensioned (in vertical or horizontal terms) to allow for subdivision, or otherwise new routes need to be thought through living quarters, which would reduce functionality of the dwelling unit.

Refining a model, and comparing it to the real world

As such emerges an idealisation which is constructed with a set of multiple (three) models. Following the sequence discussed by Weisberg,[60] this modelling process requires an analysis and refinement of the model before holding it up again against the real world. The refinement consists of an establishment of categories which combine multiple partial models, which will be compared to concrete instances of the studied building sample. In order to be as complete as possible, four dwellings will be discussed, and their position on a lot in a neighbourhood will further serve this reality check. Weisberg states, with regard to some phenomena, that "[w]hile no single model may contain the complete picture of the properties and behavior of a complex system, a collection of them can".[61] With respect to the analysis described above, this observation can be translated into the statement that aspects of flexibility can be detected in dwellings, but these aspects are not always combined in similar ways, and can either include or exclude one another. Buildings therefore need to be considered on the basis of the three models in order to establish a concept of flexibility emerging from the existing dwellings.

Recapitulating the above analysis: traditional dwellings have been dissected in order to establish 3 abstractions, which facilitate distinct viewpoint as to the question how such dwellings can be adaptively re-used in function of changing household compositions. The first abstraction considered the proportion and orientation of living spaces as a first indicator for redevelopment. The second abstraction considered the organisation of servant spaces in relation to served spaces in order to assess in what way built surplus value could be unlocked. The third abstraction considered the organisation of circulation patterns and proposed a documentation of complexity as a basis for potential. Each abstraction isolates elements which point towards a feasible subdivision. Representing the three abstractions in a table, allows for a quick overview per dwelling of its flexibility. Table 4.3 demonstrates how each abstraction allows the assignment of an overall score (a colour) and a score per subcategory (plus or minus) to a dwelling: A green field for one abstraction indicates

Table 4.3:results of the analysis for four dwellings.

		H_04		H_10		H_14		H_37	
abstraction	**subcategory**	+	-	+	-	+	-	+	-
1. Served spaces	*A. Proportion, organisation and orientation*		▪		▪	▪			▪
	B. Structural hierarchy		▪		▪	▪		▪	
2. Servant spaces	*A. Dimensions and functionality*	▪			▪		▪	▪	
	B. Distribution of functions through dwelling	▪			▪	▪		▪	
3. Circulation spaces	*A. Complexity of main circulation system*	▪			▪	▪		▪	
	B. Horizontal and vertical circulation	▪			▪	▪		▪	

an optimal combination of the two subcategories; orange shows a suboptimal combination, in other words a good score for only one subcategory. Red indicates a poor score for both subcategories of one abstraction.

The four dwellings indicated in the table illustrate how houses score very differently. What do these scores indicate? In a final test, the tree abstractions tied together will be reviewed for these four houses, and tested to the opportunities of the environment and the lot. First, consider the comparison between dwelling H_14 (**figure 76 and 77**) and H_37 (**figure 78 and 79**). H_14 is a compact, almost cubical volume composed of stacked floors, which has two bays for living spaces, and a bay for circulation in the middle. Both living bays have distinct orientations and a number of well proportioned living spaces, as well as sanitation on both living floors. The access bay in the centre is also quite wide and connects the front and rear facade; furthermore, it organises multiple circulation systems with a double access from outside. The bay structure is regular across all floors of the volume. A clustering of secondary space is mainly found in the basement, with poorer lighting conditions and as such not fit as living space. This dwelling demonstrates a maximum 'score' in terms of flexibility, as it combines good results in 5 subcategories across the three abstractions, a score which is shared with only four other dwelling in the sample of 65. Its central position on a corner lot, in a rather heterogeneous ribbon consisting of diverse building typologies of varying historical periods, also provides opportunities to insert multiple alternative units of equal spatial quality. H-37 is a dwelling, which takes shape as a single main floor typology, organised in 3 interlocking volumes, and in two of the three volumes there are living spaces, bedrooms and sanitation present. The in-built garage provides additional useable space and multiple circulation systems are organised by two separate hallways. The structural system is straightforward and divided in three bays, just with the exception of two columns outside of the

heated volume, supporting the roof overhanging over the terrace next to the living room. While it has an accessible upper floor, the roof structure limits the height which makes it difficult to appropriate these spaces for permanent living functions. The bay which houses the bedrooms is mainly oriented northwards, which also limits flexibility to turn bedrooms into living rooms. The morphology of this neighbourhood is determined by single-family dwellings, and a very limited transformation would warrant that the building does not stand out in this mono-functional environment.
Next to these 5 best-scoring dwellings, another 13 demonstrate a good result in at least one of the abstractions (combining positive results in bots subcategories). The addition of a third dwelling to this comparison, makes it clear that even on the basis of one abstraction, a subdivision may be made possible: Dwelling H_04 (**figures 80 and 81**) combines a traditional dwelling with a large garage (having only one column as a structural element), which could be combined with existing living and sanitation spaces on the ground floor. This is supported by the interlocking circulation systems and multiple entrances to the dwelling. The housing unit itself does not follow the optimal abstractions for flexibility; The roof limits the useable surface of the first floor. On the first floor, all the bedrooms are encountered while all living spaces are on the ground floor. Although there is a complex circulation system, the dimensioning and organisation of the main hallway do not offer a direct lead for subdivision. Here, an extremely large proportion of secondary space – the garage and its attic – completely determine the flexibility of the building, while the dwelling type itself offers little leads for subdivision. This is the case for many of the largest examples. As such, implementation of subdivision is feasible but hardly touches the dwelling type itself; these dwellings are moreover designed with complex structural systems (see abstraction 1) which do not allow for flexibility. Furthermore, the asymmetrical organisation of the lot demonstrates a strong orientation of this residential part on the part organised as a garden, while the servant spaces are surrounded by private open space

determined by the driveway and storage buildings. While this test demonstrates the importance of the servant spaces-abstraction for determining the potential for subdivision, such a concept also implies a certain asymmetry between the main dwelling and the additional dwelling, which will serve only specific housing demands, and which further excludes an equal subdivision without touching upon the oversize of the dwelling itself.

Lastly, the remaining dwellings which were studied (24, adding up to the total of 42 abstracted dwellings) lack good overall scores in any of the three abstractions. Consider H_10 (**figure 82**) as an example of a house which scores poorly in the aspect of all three abstractions. While of generous proportions, living space is organised by means of a complex structural system; this structural system spans a large living room. A large share of the useable floor area is therefore defined as an undividable unit by a complex system of building elements, which makes the spatial potential difficult to unlock. Another big share of space is also inflexible, because it is organised under a roof which limits height and daylight. The organisation follows the logic of the site, and all living spaces are organised on top of a garage which is accessible from the street level, so that stairs are necessary to enter the dwelling, and a large share of the gross surface area is not useable for living spaces. There is one main circulation space, which connects at one point to the outside, and which does not have the dimensions to function as a generator for a subdivision plan. The organisation of the dwelling closely follows the logic of the lot, and the resulting situation contradicts the possibility of subdivision strongly.

Interpreting the results of abstraction

The process of abstraction, as summarised in table 4.3, intends to distinguish reoccurring generic characteristics of existing dwellings, which are, as described before, varying expressions of home making by the builders (usually the initial inhabitants themselves in the case of Belgium), and are perceived as

individualistic and personal. but they also show common ground rules that relate to common national building concepts.

The performed analysis combines theory of model construction with heuristic processes proper to architectural design practice, usually part of tacit processes to look for feasible concepts facilitating the redevelopment of existing buildings. This hybrid modelling approach is developed to consider general, reoccurring patterns in the stock of Flemish detached houses, and as such prepares for discussion on policy levels. Simultaneously, it provides a model which allows for comparison with individual cases and as such can inform specific design situations. The analysis of this sample of the housing stock which has 125m² of living spaces or more, shows that such large surfaces do not guarantee potential for flexibility. The abstractions focusing on servant spaces and circulation spaces are most inclusive, meaning that they demonstrate the largest number of well-scoring buildings. The conclusion can be drawn that the surplus space, which is part of the useable floor area but not of the total living surface, is more important in indicating flexibility for these detached dwellings than the net surface of primary living spaces.

The distinction made between two approaches to subdividing a dwelling, requires a difference in emphasis on the importance of the proposed abstractions and subcategories. To recapitulate: the first option is based on a temporary subdivision for housing a care-requiring household and a care-giving household. The second approach is a more permanent subdivision of a dwelling into two smaller, but comparable units in terms of quality. For the first situation, the challenge lies in linking a temporary unit, which would entirely be on ground floor level and easily accessible, with a functional family unit, which should reincorporate the temporary unit after it has served its purpose. To accommodate such a structure, the dwelling ideally would have multiple living spaces and bedrooms, with diverse orientations, preferably on the ground

floor, taking accessibility into consideration. The spaces would be organised in distinct parts of the volume by means of a sensible structural system, either in one or multiple volumes, in order to accommodate changes for subdivision but also for reintegration after the building should be inhabited by one household again; The building should have significant and transformable secondary spaces such as in-built garages or professional spaces, which are proportioned to accommodate (part of) a housing unit or can be attached to existing living spaces, and which can be reincorporated with the main dwelling afterward – hence, abstraction 2A is indicative for the feasibility of such a strategy. The dwelling should be made accessible by means of a circulation system composed of multiple subsystems, again allowing to implement an accessible unit, hence the horizontal circulation spaces are more important than the vertical ones.

For the second approach, a dwelling needs to be able to accommodate two units, which are equal in terms of functionality; both require sufficient and functional living space, proper orientation and privacy, access from the street and to the exterior spaces. This emphasises the importance of abstraction 1. Dwellings ideally support such an intervention if sufficiently dimensioned spaces allow for a symmetrical subdivision, so that each unit also may have qualitative privacy and lighting conditions. Secondary space which is evenly divided throughout the dwelling, will also facilitate a symmetrical separation, which entails that with regard to servant spaces, an emphasis on double functions (abstraction 2B) is in order. The possibility of having a double vertical circulation system in dwellings of multiple stacked floors is essential in providing two equal units, each with direct access to outside spaces.

Abstraction and typological research: concluding remarks

The chapter rounds up with a discussion of this model of generic abstraction, and of the relationship it has to other scientific

and practice-based viewpoints on architectural typological categorisation. This chapter is based on a study of 65 dwellings, which have been analysed by means of an heuristic process, developing three levels of abstraction. From these abstractions emerge a number of typological aspects which are presented as indicators of flexibility of houses in the light of demands which are rapidly changing as a result of socio-economical and demographical developments. Based on these indicators, the process can similarly be applied by home owners who want to evaluate the opportunities their house has for adaptation such as subdivision, and who need to be informed of what concepts could be applied.

As the concluding comparison between 4 cases from the studied dwelling sample shows, an optimal combination of the modelled characteristics indicating flexibility, is quite rare. There is only a limited number of cases which combine multiple idealisations for subdivision. These dwellings facilitate a process of reinterpretation which can be initiated by an inhabitant, and continued by a designer. There are quite some dwellings which show some limited potential in the light of a possible transformation, a potential which could be capitalised by an architect. Such opportunities are however not apparent, and will require significant design attention. This infers tapping into the energy investment made in the building phase, will require intensive architectural attention as well as material investment(for dwelling extension) in order to adaptively re-use a typical detached house. If adaptive re-use of dwellings, by means of subdivision, should be a spearhead in housing policy, then the argument can be made that the more significant amount of dwellings which are constructed with generous dimensions but do not combine the characteristics of multiple idealised abstractions, require a profound redesign process. This goes against the grain of the precondition that subdivision is feasible if it can be implemented easily, capitalising on the built potential of common large dwellings.

62. Allacker, "Sustainable Building", 275.

63. Verbeeck and Hens, "Energy savings in retrofitted dwellings": 752.

The abstractions are not concluded, meaning that they could be elaborated based on a larger sample. The approach of Multiple Models Idealisation, combining a set of relevant abstractions, also should be seen as an open method, as it allows for further inclusion of abstractions of relevant aspects. The followed process of abstraction has purposely removed a number of factors out of the equation. For example, these abstractions have left out concepts of style. One important observation is that the dwellings which result to be close to an outlined ideal of flexibility, demonstrate arguments which can be considered in the overall approach of retrofitting, and influence other architectural decisions. Dwellings such as H_14 (**figures 76-77**), H_37 (**figures 78-79**) and H_50 (**figures 45 and 71**) are dwellings built in the 1960s with cavity walls and pitched roofs without insulation. These dwellings are considered flexible in the analysis proposed. This quality may determine the feasibility of retrofitting older houses. Karen Allacker in her doctoral dissertation concludes that it is expensive to adapt to contemporary indoor climate and insulation standards for buildings predating 1970.[62] But because exactly such older houses have interesting typological configurations, and because the cost-benefit balance is very positive (even a limited, initial investment, adding the first centimetres of insulation material, will deliver significant improvement as no insulation is present at the moment[63]), such typological qualities can help in deciding the usefulness of intrusive retrofitting approaches. As such, the analysis contributes with additional organisational criteria to the evaluation of building quality, supporting decision making for which dwelling types merit adaptation and improvement.

Another key aspect which is essential to architectural practice is the relationship of the building to its lot and the neighbourhood in which the dwelling is constructed. This aspect can best be addressed in more specific design practice, contrasting the generic stance of this proposed modelling process. Also comparable academic studies of building categorisation, which focus more on the relation

between building and the site, could inform a more complete evaluation. In this respect, it is essential to discuss *typological research*, the taxonomy of built objects, which has been developed in conjunction with *morphological research* of settlement patterns within diverse national architectural research environments. In the Italian context, The *Muratorian school* developed detailed urban analysis, proposing a dialectic relation between building typologies and the historical development of urban form specific to a city or a region, as a source for contemporary architectural practice.[64] This analysis of physical, built forms was developed by Italian architect Saverio Muratori and his followers, at the universities of Venice and Rome, as a reaction against the modern movement in architecture, which had turned away from the historical city. In France, the architects Jean Castex and Philippe Panerai, together with urban anthropologist Jean-Charles Depaule, developed this form of analysis further, adding to the analysis of physical form, the sociological impact such built forms have.[65] These researchers shared an equal finality with their Italian predecessors, to analyse in order to establish a better design practice, striving for a closer connection to the historical city and its architecture, and have focused their attention on *ordinary* buildings and how these make up the form of cities; as such, representing a far larger quantity of the built environment than *special* buildings which, so they criticize, receive more attention within architectural practice and education.[66]

Although the research here at hand shares an interest to devise an analysis for informing design decisions, as well as a focus on *ordinary* buildings (often being at most modest architectural achievements) with the morphotypological schools, the scope of this enquiry has differed significantly. For one, the defence of traditional urban tissue that manifests as a protest against the modern movement in architecture is less relevant. More importantly, the analysis on the basis of abstractions presented here, does not search for a characteristic relation between dwelling

64. Gianfranco Caniggia, and Gian Luigi Maffei, *Interpreting basic building: architectural composition and building typology* (Firenze: ALINEA Editrice, 2001); Giancarlo Cataldi, Gian Luigi Maffei, and Paolo Vaccaro, "Saverio Muratori and the Italian school of planning typology," *Urban Morphology* 6, no. 1 (2002): 3-14.

65. Michael Darin, "The study of urban form in France," *Urban Morphology* 2, no. 2 (1998): 63-76.

66. Jean Castex, Phillipe Panerai, Jean-Charles Depaule, and Ivor Samuels, *Urban Forms: the Death and Life of the Urban Block* (Oxford: Architectural Press, 2004)., vii.

typology and urban morphology, but would rather seek the potential to alter such a relation in line with social and demographic developments, by means of looking at the typology which forms the smallest common denominator in diverse morphological tissues, being the detached dwelling itself. On this level, it aims to demonstrate opportunities for adaptation of urban tissue. The comparison to the real world which was made, demonstrates how the morphology of the environment determines whether there is a fertile soil to implement a transformation in a certain housing situation. This method of abstraction gives an indication of the feasibility of subdivision, and of the methods of implementing such a subdivision, taking into account simplicity and future flexibility. The scope of the overarching research project resulted in the methodological and pragmatic choice of such an enquiry into under usage on the level of the dwelling. The entailed that the formulated hypotheses address this scale level of the dwelling, and required reformulation to involve a study of under usage on larger scale levels, such as the neighbourhood and the municipality. This shifted hypothesis urges to involve the arguments developed in this chapter in a continued enquiry of the residential environment on different scale levels in the ensuing chapters.

5
Professional perspectives on housing: the position of the Flemish detached dwelling in design strategies

In the two previous chapters, two pieces of the puzzle are put in place: these chapters report of the viewpoints of inhabitants with regard to transformative strategies on the one hand, and enquire into the potential of the smallest common denominator – the detached house on its lot – to play out a continued role in such transformation strategies. In practice, the area of tension between private as well as societal demands and potential of the built environment is explored on a daily basis by professionals such as architects, spatial planners, and real estate agents. They weigh arguments such as put forward in the previous chapters, and interact with clients, politicians or developers in producing and maintaining space. In this chapter, transformative concepts are tested to the viewpoints of these professionals. On the basis of this enquiry, a more detailed account of the three transformative strategies is developed.

Like in chapter three, design thinking has been involved in preparing and structuring the discussion with these professionals. The professional experience of these respondents required more detailed concepts and visualisations. The three main strategies were explained on different scale levels, involving (depending of the professional role of the respondent) representations of detailed, partial strategies, a taxonomy of different residential environments, and examples of implemented projects in the Flemish context. Not only the conceptual and practical conditions of these transformative strategies were discussed. Also the specific practice of these respondents was recorded. Designers related the interview to some of their own projects; real estate agents and planning officials were interviewed about the specific conditions of the municipalities or regions they operate in.

In order to analyse the position of these professionals, two theoretical frameworks are elaborated. The framework of STS studies, including the concept of obduracy, is used to analyse the modus operandi of these professionals regarding the detached dwelling and the low-density residential environment. This theory provides concepts for explaining why such environments are resistant and explains professional methods to deconstruct or to reinforce such resistance in the built environment. Hence, this line of thought centralises built objects as artefacts to be studied. In addition, theory on transition management is used to frame the efforts of professionals to search for novel approaches to spatial production, politicised by a desire for a more efficient and more durable residential environment. This theory also helps to frame different approaches to improvement, relating to opposite opinions of feasible design and construction. This theory centralises the professional culture in relation to overarching societal developments and pioneering initiatives.

Introduction: involving professional stakeholders

This chapter has a double aim, which is primarily to enquire into the agency of professional actors with regard to the gradual adaptation of the Flemish housing model in line with changing demands, and secondly, to document the concepts and strategies which are propagated and implemented by spatial designers, with a special focus on the role of existing detached dwellings in these concepts. The main source is found in professional experiences and positions, which were documented in interviews, complemented with viewpoints recorded in local professional literature. This viewpoint allows for a study of the professional apparatus which contributes to spatial (re)production, and possibly, change in this mode of production. The previous two chapters have documented the viewpoints of inhabitants regarding developments to their residential environment, and a search for aspects of flexibility in their dwellings. In this chapter, a leap to include professional viewpoints involves a study of transformation as well as transition processes. The detached dwellings and the lot structure in which they developed, will be explained as elements in a hybrid network which resist transformation, which demonstrates resistance. This notion is connected to the contribution of professionals to transition processes in a broader sense(both by facilitating and obstructing transition), which involves theory of transition management. Technological arguments as well as societal arguments are of comparable weight in determining a feasible future housing policy: in the words of Wiebe Bijker, an engineer who has developed as an academic studying the relation between society and technology in the context of science, technology and society (STS) studies, this system may be termed a *sociotechnical ensemble*.[1] Theory of obduracy in the built environment and transition management, two frameworks connected to STS, will be discussed next to one another.

This chapter is structured as follows. First, these theoretical concepts of the sociotechnical are examined, and related to the

1. Wiebe E Bijker, *Of Bicycles, Bakelites and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge: the MIT Press, 1995).

case of detached dwellings in Flanders at hand. Based on this examination, the aim is broken down into three parts, which investigate the following questions: do professional actors see dwelling transformation and subdivision as a feasible approach to the production of housing? What strategies do the designers propose to follow, and how does their perspective on the detached dwelling fit in? And what are the encountered difficulties for implementation of these strategies? These questions are addressed by drawing upon the interviews and literature together. The chapter concludes with a critical discussion of the opportunities and instruments which professionals in architecture and urbanism have with regard to re-development of the housing stock, and in what way their professional agency has an impact on spatial change.

Studies reporting of academic, institutional and professional viewpoints on the sustainability of the built environment form an important source of input in this chapter. It is from the discussions on this topic, that the interrelation of societal and technological aspects becomes clear. The discourse is characterised by a broad discussion of potential strategies to achieve, in a cost-effective manner, lower emissions of greenhouse gasses, better energetic performance, and improved spatial planning. The doctoral dissertations of Griet Verbeeck and Karen Allacker discuss the feasibility of strategies for new construction and retrofits on the scale of the building.[2] Han Vandevyvere projects the question on a larger scale, and argues in favour of a sustainable urbanism, which should be based on more compact and functionally complex configurations, in well-situated and accessible locations.[3] This implies a stronger breach with the traditional construction sector, but also a search for concepts which fit the reality of the Flemish dispersed settlement pattern. While these studies emphasise diverse possible transition pathways, a commonly emerging viewpoint is that complexity, and uncertainty, determine the search for improved sustainability of the residential environment. The need

2. Karen Allacker, "Sustainable Building: The Development of an Evaluation Method" (unpublished doctoral dissertation, KU Leuven, 2010); Griet Verbeeck, "Optimisation of Extremely Low Energy Residential Buildings" (unpublished doctoral dissertation, KU Leuven, 2007).

3. Han Vandevyvere, "Strategieën voor een Verhoogde Implementatie Van Duurzaam Bouwen in Vlaanderen" (PhD thesis, KU Leuven, 2010).

for a broad societal involvement in this search comes to the fore in initiatives such as the Belgian Sustainable Building Council and the DUWOBO platform. The former is an ongoing project of joining institutional and professional partners into a council which certifies and supports sustainable building.[4] The latter initiative is a project initiated in 2004 by the Flemish government to stimulate fundamental societal changes, which are necessary to obtain a more sustainable housing model.[5] The merits of this platform lie in the clear recognition of the complexity of spatial problem issues, and in the acknowledgement that diverse pathways may lead towards diverging solutions in the future, with equal potential. The vision published in 2007 by this platform focuses on strategic steps in the process of sustainable development, rather than on one singular outcome. The viewpoints of professionals documented in this chapter should be seen as exemplary of this ongoing search and unresolved controversies.

Over the course of this research project, 25 interviews with professional actors were carried out between 2011 and 2013, during which the tree main strategies, were discussed in more detail.[6] This included professional designers, real estate agents, and municipal planning officials.[7]

The 10 professional designers were approached because of their diverse experience with housing. This diversity most clearly manifests itself in the scale and nature of projects these designers work on. Among the respondents were designers who have many individual family houses in their portfolio (Heynickx, Gillekens and Simoni). This choice coheres with the size of their design offices, their personal experience, but also with local demands in the area where they operate. Another group works (or has worked) on single family housing projects for individual clients selectively, and also work on larger, collective housing schemes. These designers indicated that the project brief for an individual house would be accepted if it proves an interesting challenge, or

4. Such a council would allow a Belgian entrance into the international World Green Building Council, a network giving access to knowledge and best practices in sustainable building. See http://www.worldgbc.org/ [accessed 07 November 2013].

5. DUWOBO is an acronym for *sustainable housing and building*. Their vision is published in: Transitiearena Duurzaam Wonen en Bouwen, "Vlaanderen in de steigers: Visie op duurzaam wonen en bouwen in 2030 en actie voor nu" (2007) <http://www.duwobo.be/media/transitieagenda_2007.pdf> [Accessed 06 November 2013].

6. See appendix 2. Additional interviews were held, which however did not include a discussion of the development scenarios, and were not considered in the context of this chapter.

7. In the case of one municipality (Keerbergen), the alderman of spatial planning chose to act as a respondent instead of the spatial planning official.

a fitting answer given certain spatial circumstances. Also, another group has stated that the individual dwelling has no part in their portfolio, and focus on collective housing (Swartenbroux) or large scale projects, involving urban planning (Geenen, Vaes, Vermeulen). This again has to do with the size and experience of their respective offices, but also with a critical attitude towards the detached dwelling and traditional spatial planning related to it. These designers show a strong interest for redevelopment of brown field locations or existing residential neighbourhoods. Beyond their portfolio of (realized) projects, for some of the respondents, their interest in housing also manifests in their activity of lecturing at schools of architecture. Two respondents (Dierendonck and Somers) were contacted because of their contribution to the *pilot project housing*, a project investigating the feasibility of inserting alternative housing typologies in exemplary, Flemish residential areas, characterised by dispersed building patterns.[8] This pilot project is the result of a government initiative involving architects to design exemplary projects which demonstrate an approach to housing production differing from common (individualised) practice, and put forward a higher level of collectivity as a condition for sustainability. This choice to contribute to such a published – but unbuilt – study distinguishes them from colleagues who focus on pragmatic assignments.

The 5 interviewed real estate agents operate in regions which include some of the case study municipalities of this project. The 10 municipal officials were interviewed as representatives of the case study municipalities which were studied throughout this research.[9] Additionally, the planning official of the municipality of Vorselaar, in the Campine region, province of Antwerp, was included (a case of snowball sampling). This was done because of the specific policy being implemented in this village, which phrases concrete ambitions to facilitate subdivision and shared usage as a main strategy for housing production.

8. Joachim Declerck, Michael Ryckewaert, and Stefan Devoldere, eds., *Pilootproject Wonen, Nieuwe Vormen Van Collectiviteit* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013).

9. In nine of the 10 case study municipalities, a respondent was found willing to participate; only in Aalter, participation was refused.

The interviews[10] were based on the initial review of design strategies as presented in the previous chapters, and on an additional review of relevant spatial practices, laid out in local policy documents such as municipal spatial structure plans and housing policy plans, architectural plans, and zoning plans. The three prototypical scenarios which were discussed with inhabitants were discussed more profoundly, giving more attention to the diverse strategies on different scale levels: the dwelling, the lot, and the neighbourhood (see **figures 27-29**). These generic concepts were further discussed on the basis of additional illustrations, such as exemplary Flemish dwelling types, which were represented in architectural drawings (plans and elevations), and of exemplary situations of Flemish allotments, ribbon developments and residential forests, which were selected from the case study municipalities and represented by means of aerial photographs. Furthermore, concrete examples of projects which insert alternative (and more dense) residential typologies into such built fabrics, both built examples and cases still in a design stage, were discussed, on the basis of architectural renderings and aerial photographs. The prototypical schemes were also discussed with the planning officials, and were related to occurring building practice and governmental ambitions within the context of the local situation of the municipalities.

Because of the ambition to enquire into the general disposition towards the Flemish detached dwelling and low-density neighbourhoods, the interview questions, as well as the schemes illustrating the questions, had a generic character. It has proved difficult to discuss generic topics with designers, who are committed to the development of problem solutions for specific situations and conditions. Therefore, the designers were invited to illustrate their viewpoints also with their own work. Some of them furthermore spontaneously explained their perspective with sketches made during the interview.

10. A semi-structured schedule was followed, and the interviews took between 55 and 98 minutes.

Two theoretical counterparts: obduracy and transition management

In this section, two theoretical registers will be explored. First, there is the concept of *obduracy*[11], which provides a detailed account of conditions for implementing change in a concrete, spatial situation. This concept is rooted in the tradition of symbolic interactionism. One of the pioneers of symbolic interactionism, Herbert Blumer, states that the nature and meaning of an object are constructed rather than inherent to the essence of this object, by individuals who determine this meaning in their mode of (inter)acting with such an object.[12] This furthermore occurs in the context of a society with a specific interpretation and expectation of such an object, which does not diminish the capacity of an individual to approach, to study and reflect upon such an object. Oburacy also developed under influence of theories such as the Social Construction of Technology (SCOT) and Actor Network Theory (ANT).[13] In this theoretical context, the cultural and social interpretation of an object (such as a house or a lot in this context) can be unlocked for reinterpretation by means of analysis of the process of constructing meanings.

In her study of three spatial cases and their planning processes in an urban context in the Netherlands, Anique Hommels has specifically studied the difficulty of spatially altering controversial objects in the context of a city, and demonstrates the importance of this theoretical strand for the discipline of architecture. She explains obduracy as a complex condition, obstructing change or removal of built artefacts and urban situations, which involves many factors, material as well as immaterial. She further positions it as a concept explicitly considering these pluralistic factors simultaneously. Obduracy should not be explained exclusively by means of single-factor explanations, such as excessive costs, indecisiveness, power division, and persistent technical properties.[14] O*bdurate* is defined by Merriam-Webster as being "unwilling to alter a predetermined course or purpose". Hence,

11. Anique Hommels, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT Press); Anique Hommels, "Studying Obduracy in the City: Towards a Productive Fusion between Technology Studies and Urban Studies," *Science, Technology, & Human Values* 30, no. 3 (2005): 323-351.

12. Herbert Blumer, *Symbolic interactionism: Perspective and method* (Englewood Cliffs: Prentice Hall, Inc., 1969).

13. Anique Hommels, Peter Peters, and Wiebe E Bijker, "Techno therapy or nurtured niches? Technology studies and the evaluation of radical innovations," *Research Policy* 36, no. 7 (2007): 1088-1099.

14. Hommels, *Unbuilding Cities*, 19-20.

15. Co-researcher Wouter Bervoets has conceptualised obduracy of the typology of the detached house with regard to sharing or subdivision on the scale of the lot. In contrast, in the following chapter, obduracy will be explained in terms of how the low density, residential environment consisting of freestanding houses obstructs the implementation of diverse unorthodox design strategies (while the dwelling itself is not so obdurate as it can be demolished and replaced with another one quite easily). See also Wouter Bervoets, and Hilde Heynen, "The Obduracy of the Detached Single Family House in Flanders," *International Journal of Housing Policy* 13, no.4 (2013): 358-380.

focusing on unwillingness, this concept relates to *resistance* against change based on broader technical, cultural, social and economic arguments of diverse involved stakeholders.[15] Obduracy as such is used an inclusive concept.[16] Obduracy lies closely to the concept of inertia. Inertia, in this context, is used to focus on the influence of technical properties on projective decision-making by architects and urban planners. Merriam- Webster states that *inertia* is a "lack of movement or activity especially when movement or activity is wanted or needed", which is interpreted here as technical properties of built artefacts and neighbourhoods impeding implementation of alternative design concepts.

Hommels proposes three models for conceptualizing this obduracy.[17] The first one is the *dominant frame,* which builds upon the concept of the *technological frame* proposed by Bijker.[18] A technological frame explains the interaction between a certain social group and a technological artefact. The dominant frame explains obduracy of built objects as a result of a prevalent and determined way of thinking and acting of involved professional groups, even more so for actors who do not operate within the dominant frame. Hence, in the case when different frames are involved in complex development projects, these differences cause resistance in tackling a given problem. Aibar and Bijker explain that spatial change can be finally implemented as a hybrid of the two frames, combining several key concepts proposed by different professional groups.[19] A process of "delegation of power" and "delegation of authority" between two frames facilitates such exchange, and may lead to the implementation of spatial plans.[20] In the Flemish context, like in the international context, the debate on how to obtain a more sustainable built environment illustrates the diverging opinions and strategies among technological frames. As a result of such controversies, also delegation of authority can be pinpointed, for example from the account which André Loeckx provides of recent urban renewal projects in Flanders.[21] In several concrete cases, designers have readjusted their role and contribute

16. The focus on alternative design concepts is important in this context: the built objects themselves are easily demolished and replaced, which in effect is occurring. However, they are replaced with new detached dwellings, and as such the spatial organisation of a neighbourhood remains unaltered.

17. In the context of this research, it goes too far to retrace all the sources which are mentioned in Hommels' *Unbuilding Cities*, and only concepts relevant to this research are discussed.

18. Bijker, *Of Bicyces, Bakelites and Bulbs*.

19. The concept of the dominant frame is an elaboration of the technological frame, coined by Eduardo Aibar, and Wiebe E Bijker, "Constructing a City: The Cerdà Plan for the Extension of Barcelona," *Science, technology & human values* 22, no. 1 (1997): 3-30.

20. Aibar and Bijker, "Constructing a City": 21-22.

21. André Loeckx, "Project and Design, Amending the Project Mode," in *Framing Urban Renewal in Flanders*, ed. by André Loeckx (Amsterdam: SUN Architecture Publishers, 2009): 18-29.

to the definition of a project brief rather than just accepting one, while they also delegate authority with regard to the design process in co-productive or participatory projects.

The second model is termed *embeddedness*, and explains obduracy in terms of how an object is tied into a network. Hommels traces this model to the concept of large technological systems, containing many complex components, which can be read as such networks.[22] In the context of this research, we can for example recognise embeddedness in the way detached dwellings relate to the infrastructure which facilitate their existence, such as sewers, roads, neighbours, and so on (as documented in **figure 26**). As Michael Ryckewaert has explained, the development of infrastructural and industrial projects, along with economic developments from a taylorist to a fordist model, has led to a well determined interaction between economic hubs and the dispersed production of houses.[23] In addition, the societal preference for the detached dwelling adds to the upholding of this spatial system. Hence, "human and non-human 'actants'," [24] jointly determine the obduracy of the predominant Flemish housing model based on the typology of the detached dwelling. Such ties make it difficult to alter singular elements of the network without demanding a recalibration of the network in its entirety.

Thirdly, *persistent traditions* explain how shared viewpoints across different groups of actors hold a technological system in place: as such, it provides an explanation of obduracy in dynamical terms – which, in the case of this research, would be the case for planning instruments like the regional zoning plans – and includes an emphasis on historical development of such a system. The Belgian regional zoning plans outdate the more recent Flemish structure plans, and as such facilitate continuation of a spatial practice of another time (most of these regional zoning plans were drawn up and approved in the seventies), which is in conflict with the contemporary municipal policy vision of some communities.[25]

22. Thomas P. Hughes, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems*, ed. by Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch (Cambridge, London: The MIT Press, 1987): 51-82.

23. Michael Ryckewaert, Building the Economic Backbone of the Belgian Welfare State: Infrastructure, Planning and Architecture 1945-1973 (Rotterdam: 010 Publishers, 2011).

24. Hommels, *Unbuilding Cities*, 30.

25. Some examples of such conflict are discussed later on in this chapter.

Project developers, real estate agents and individual builders make use of these rights to continue subdividing and constructing on vacant terrains.

Obduracy is a meaningful concept which is used here further to explain the concrete interaction of spatial professionals with the built environment, such as built objects or allotment plans. Spatial (re)production also has an impact on professional traditions and tendencies. The production of designs especially may become exemplary in particular movements, which becomes visible in the production of *paper architecture*. Paper architecture is formed by the plans of architects which remain a product of the drawing table and are not (yet) executed, which may well not even have been designed with that intention, but which develop to have an important role in professional discourse. Architectural theoreticians Doucet and Cupers acknowledge such design which, in some levels, transcends the here and the now of the real world, the essence of agency, since it states an answer to the question "what can we hope for?"[26]

Such impact of professional requires that a complementary theoretical register is drawn on, namely, transition management. Theory of transition management shares its origin with theory on obduracy in STS.[27] It differs however in its analysis of long-term processes of transition, described as evolutionary processes of transforming a system; it has another root in evolutionary economics.[28] This theory is strongly interrelated with sustainability science, and also differs from obduracy theory in its political ambition to strive for higher levels of sustainability with policies regarding technological systems.[29] Practically, in theory of transition management, the units of analysis are of another order. It makes a distinction into *sociotechnical regimes* (an institutionalised system of problem defining and solving, based on a certain paradigm and producing incremental development steps) and *technological niches* (small initiatives of technological

26. Isabelle Doucet, and Kenny Cupers, "Agency in Architecture: Reframing Criticality in Theory and Practice," *Footprint*, no. 4 (2009): 6.

27. Hommels et al., "Techno therapy or nurtured niches?": 1097.

28. See the discussion published in Research Policy regarding two models of innovation management rooting in two distinct theoretical traditions (one of obduracy, the other on of evolutionary economics): Hommels et al., "Techno therapy or nurtured niches?": 1097; Frank W Geels, and Johan Schot, "Comment on 'Techno therapy or nurtured niches?'by Hommels et al.[Res. Policy 36 (7)(2007)]," *Research Policy* 36, no. 7 (2007): 1100-1101.

29. Derk Loorbach, and Jan Rotmans, "The practice of transition management: Examples and lessons from four distinct cases," *Futures* 42, no. 3 (2010): 237-246; Jan Rotmans, *Transitiemanagement; sleutel voor een duurzame samenleving* (Assen: Koninklijke Van Gorcum, 2003).

development, proposing radical innovations, but which are based on networks outside of the main sociotechnical regime, and as such have no foothold to implement these innovations) which both operate in the context of a overarching landscape combining slowly developing social, technical and natural conditions.[30]

Changes in sociotechnical regimes may occur from within, when a discipline gradually reinvents itself, or from within the radical niches, in the case when a regime has no answer to the impact of changes in the sociotechnical landscape. Professional actors can instigate such change by using or changing the professional rules of the game.[31] The theoretical side of transition management studies how such initiatives can be positioned in the evolutionary development of a certain sociotechnical system. *Path dependency* is a concept used to explain an idea of advancement, which is determined by a historical course of developments: one path is followed as a result of history, while alternative paths are harder to reach.[32] For example, De Decker has analysed the Flemish desire to own a detached house in a nonurban environment as the strongest factor resisting spatial change, referring to the concept of path dependency.[33] Raghu Garud et al. propose *path creation* as an alternative perspective for path dependency; arguing that aspects of obduracy within the concept of path dependency are constructed, while specialised actors have skills, experience and knowledge to deconstruct this obduracy.[34]

In the case of this research, demographical developments, (awareness of) environmental issues and shifting lifestyles can be seen as changing aspects of the sociotechnical landscape, for which architects are required to find professional answers. The system of housing production in Flanders may be seen as a sociotechnical regime, which is currently changing its mode of production to provide smaller houses in a gradual way; In accordance with demographical developments, contemporary architectural production is ever more drifting away from the

30. Frank W. Geels, "Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study," *Research Policy* 31, no. 8 (2002): 1257-1274.

31. Frank W. Geels, and Johan Schot, "Typology of sociotechnical transition pathways," *Research Policy* 36, no. 3 (2007): 399-417.

32. Bo Bengtsson, and Hannu Ruonavaara, "Introduction to the Special Issue: Path Dependence in Housing," *Housing, Theory and Society* 27, no. 3 (2010): 193-203.

33. Pascal De Decker, "Understanding housing sprawl: the case of Flanders, Belgium," *Environment and Planning A* 43, no. 7 (2011): 1634-1654.

34. Raghu Garud, Arun Kumaraswamy, and Peter Karnøe, "Path Dependence or Path Creation?," *Journal of Management Studies* 47, no. 4 (2010): 760-774.

detached dwelling. Smaller, more compact dwelling types in dense housing environments gain more importance in the building industry. The image of the detached dwelling is still present, but because lots get smaller, houses are positioned more compactly within the alignment of a lot.[35] This is a gradual development of the regime responsible for housing production and spatial planning. Han Vandevyvere in addition points out the role of niche-players, who strive for more radical change, but only have an impact on a limited scale because of the resistance they encounter from the dominant regime.[36] These are researchers, private parties in the market, but also local governments who aim to implement visionary projects. The platform DUWOBO strives to bring together these diverse players, both operating within regime and niches, but also non-specialised inhabitants, to contribute to a widely supported process of transition.[37]

While differing theoretical foundations, units of analysis and finalities need to be taken into account, a balanced consideration of both theories of obduracy and of transition management allows for an alignment of two interrelated aspects. These are the professional viewpoints on transformation of buildings and lots, and the functioning of a professional society in search for meaningful transformations in the process of establishing a more sustainable residential environment. In the following paragraphs, the question whether the basic elements of the housing system, the dwellings themselves, can be adapted is addressed primarily. Secondly, the way designers incorporate their viewpoint into larger design strategies is investigated, and also how their strategies relate to (dominant) technological frames, traditions, and innovative niches. Thirdly, this chapter documents resistance towards change, and analyses how obduracy of residential environments manifests in the Flemish situation. Data obtained in interviews serves as the basic input, and is framed by further elaboration of the discussed literature.

35. Pascal De Decker, Michael Ryckewaert, Brecht Vandekerckhove, Ann Pisman, Frank Vastmans, and Marie Le Roy, *Ruimte Voor Wonen, Trends En Uitdagingen* (Antwerpen, Apeldoorn: Garant, 2010).

36. Vandevyvere, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen",71.

37. Transitiearena Duurzaam Wonen en Bouwen, "Vlaanderen in de Steigers".

How is the detached dwelling perceived? Arguments for and against adaptation

Two viewpoints on adaptability of the dwelling emerge from the interviews; each of these viewpoints explains a certain position towards bringing a dwelling up to date with contemporary technical standards, and towards changing its functionality by transforming an oversized dwelling into a multi-family dwelling. There is a common acknowledgement among the designers, that the stock of detached dwellings demonstrates a poor physical quality, mainly in terms of energy performance. As is mentioned by almost every respondent, remedies can be implemented but are rather complicated, and moreover, costly. This is where viewpoints diverge; on the one hand, a number of designers accept this challenge to bring such dwellings up to date. As such, they also tend to accept the situation of the diffuse Flemish urbanisation and the reality of designing in traditional residential zones. Opposing that approach, a second group of designers consider the low energetic standard and the obsoleteness of the low-density neighbourhoods and detached dwellings as sufficient ground for rigorously proposing alternative design pathways. In the following discussion, we will therefore make distinction between *re-use optimists* and *re-use pessimists*. Both of these groups emphasise aspects of sustainability in a different way.

Re-use optimists mainly base their argumentation on a number of reasons. For one, there is the perception that designers have a professional responsibility, and the necessary knowledge, to develop efficient plans allowing for re-usage. Such re-design should focus on extending the course of life of these dwellings. According to Vandevyvere and Verbeeck, for a renovation, a relatively short payback time of about 5 years can be achieved when choosing for clever investments, which pleas for renovation in lieu of demolition and reconstruction, which would have a long payback time of more than 20 years.[38] The costly measures of making a dwelling more energy efficient in line with contemporary

38. Han Vandevyvere, and Griet Verbeeck, "Duurzaam bouwen en wonen," in *Duurzame ontwikkeling: Een multidisciplinaire visie*, ed. by LONDO (Leuvens Onderzoeksnetwerk Duurzame Ontwikkeling) (Leuven: Uitgeverij Acco, 2009, repr 2013): 141-173.

building standards[39] are even seen as the right opportunity to additionally opt for updating the typological organisation of such dwellings, in order to develop a thorough improvement at once:

> *"Existing dwellings all have the same problem of course, which is the fact that it is difficult to optimize them in terms of energy efficiency, unless one takes serious costs into account. So if you opt for those costs, at the same moment, you need to improve the typological or practical issues of such dwellings, all at once."* (De Smet, De Smet Vermeulen architecten)

Designers who evaluate renovation projects as feasible, base their decisions on a critical attitude, and list strict criteria for a successful redevelopment project. The primary condition is that the designer perceives enough quality in the carcass of the building; the load bearing structure and the outer shell. In traditional Flemish dwellings, typically built with massive or cavity brick walls, the outer shell is part of the structure, and as such, a durable whole. In his study on adaptation of historical buildings, designer and futurist Stewart Brand sees the structure of a building as the element which has the second longest lifecycle, after the permanency of the site itself, and is the framework for applying changes to the building skin, the space plan, services and the interior furnishing.[40] A negative evaluation of this durable structure would lead to an advice for the client not to renovate the dwelling. Such criteria are based on structural design (many thin, load bearing walls within the volume require a difficult operation) the state of the building (whether there is damage from humidity or fungus, or structural damage such as cracked walls) and the historical quality of a dwelling – meaning that historical significance may influence the weighing of more technical criteria. With regard to the design process, the difficulty for laymen to estimate the quality of an existing dwelling, or the feasibility of a project of transformation with the finality of cohabitation, was put forward as a problem.

39. Typical measures are described by Griet Verbeeck and Hugo Hens: They propose a priority list for implementation, which allows to balance efficiency with costs. See Griet Verbeeck, and Hugo Hens, "Energy savings in retrofitted dwellings: economically viable?," *Energy and Buildings* 37, no. 7 (2005): 747-754.

40. Stewart Brand, *How Buildings Learn* (London: Penguin Books, 1994).

> *"Usually, people have bought a property, (...) and then, they start to search for an architect. (...) Too little, we are asked to come along to a property sale, in order to give advice whether it is interesting to buy the property or not."* (Gillekens, architect)

A transformation of the typological functioning of a dwelling might also include the development of alternative forms of inhabitation, by means of subdividing the dwelling. A number of the designers see, in their daily practice and in their personal environment, a certain demand for small forms of shared inhabitation under one single roof, inscribed in the context of the Flemish low-density residential environment. In its most modest form, this manifests as a main unit, and an additional accessory apartment.[41] The work field of some of these designers –such as Gillekens, who works in the ring of suburban municipalities around Brussels – is situated in regions with a high pressure on the housing market (see also **figure 83**).

> *"The call is enormous. There is a huge demand created by elderly people who want to live in a smaller house. There is a demand created by people who want to subdivide a dwelling."* (Gillekens, architect)

Next to the observed need for alternative dwelling types, the historical character of a place is a factor taken into account by re-use optimists. They perceive the contemporary built environment as the sediment of history, in which interventions should be planned cautiously and respectful, in order not to lose this part of history. In their perspective, the dwellings as singular objects represent a certain timeframe in the centuries old settlement development, which can be ascribed certain qualities, that will remain valuable in the future. One of these qualities mentioned is the morphological structure which is a historically grown organisation of diverse residential densities, and which determines the legibility of the

41. Patrick H. Hare, and Jolene N. Ostler, *Creating an Accessory Apartment* (New York: McGraw-Hill, 1987); Nancy J. Chapman, and Deborah A. Howe, "Accessory Apartments: Are they a realistic Alternative for Ageing in Place?," *Housing Studies* 16, no. 5 (2001): 637-650; Jane Nichols, and Erin Adams, "The Flex-Nest: The Accessory Dwelling Unit as Adaptable Housing for the Life Span," *Interiors* 4, no. 1 (2013): 31-52.

built landscape, allowing one to distinguish consecutive historical growth phases. Another aspect is the open and green quality which is ascribed to small villages, and to the allotments within their municipal boundaries.

The existing housing stock is furthermore perceived by the optimists as a source for re-use in response to the future housing demand ready to tap into before considering new construction. The described qualities could be preserved and alternative dwelling types could be implemented in a settlement simultaneously. What emerges is a discourse that contributes to the resilience of low density Flemish settlements, based on the arguments that the spatial planning tradition for such areas should be continued, in order to preserve the inherent qualities, and because an earlier generation of dwellers has invested in their dwellings in such a way, that a surplus has been constructed which can be used by current-day dwellers according to their own needs.[42]

> *"...exactly because these dwelling types have such a large footprint, it is appropriate to transform one into two semi-detached houses, provided that you make a small expansion, or to transform one into three semi-detached dwellings, provided that you make a somewhat bigger expansion. When you thoroughly tackle energetic problems, you can simultaneously create 3 good dwellings in the constellation of an older, mediocre, single housing unit."* (De Smet, De Smet Vermeulen architecten)

The re-use optimists see potential connections between the existing housing stock and future demands. Their criteria for feasibility are in line with arguments such as proposed by Verbeeck and Allacker in their respective doctoral dissertations.[43] On the opposite side, re-use pessimists rather argue that the poor structural and physical qualities of post-war detached dwellings are enough reason to oppose subdivision of dwellings. Their argumentation is built on

42. Anique hommels theorises that such discourses reinforce obduracy of a certain system. See Hommels, *Unbuilding Cities*, 189-192.

43. Verbeeck, "Optimisation of Extremely Low Energy Residential Buildings", and Allacker, "Sustainable Building: The Development of an Evaluation Method".

the notion that technical improvement, combined with typological adaptation, is a costly endeavour which will not offer a proper answer for providing sustainable housing.

> *"I fear that this [subdivision] is not the solution for that built patrimony (...) No, in terms of energy efficiency, this concept causes a huge problem. Just consider the principle that a detached dwelling with 4 facades is de facto less sustainable. You can completely insulate* [such a building] *tomorrow, but it will still not be sustainable. I think, in this aspect, we can only ascertain that there is little future in that approach."* (Vermeulen, Stramien)

The physical improvement of a detached dwelling, a free-standing object, entails treatment of a larger surface, in comparison to the case of a terraced house or an apartment, where the number of dividing walls and floors which are shared with the neighbours ensure that less heating energy goes lost. This is in line with conclusions drawn from academic research, where, in an international context, the detached dwelling is proven to be connected to larger levels of energy consumption per household for building operations such as for electrical equipment, heating, cooling and so forth, in the life phase[44] and also in terms of everyday transportation[45], since the detached dwelling is usually found in a low density, decentralised location. Furthermore, the spatial organisation of detached dwellings, and the way they are positioned on their lot, do not allow for a complete subdivision, which would also provide each resulting unit with private outdoor spaces such as a garden or a proper terrace.

> *"...because most of the time, it is not so simple to subdivide such a dwelling into two units, neither to warrant privacy for both inhabiting households. It's usually not the case that such lots can simply be partitioned, which people would require, in fact"* (Geenen, WIT architecten)

44. Petter Naess, "Urban Planning and Sustainable Development," *European Planning Studies* 9, no. 4 (2001): 503-524.

45. Jonathan Norman, Heather L MacLean, and Christopher A Kennedy, "Comparing high and low residential density: life-cycle analysis of energy use and greenhouse gas emissions," *Journal of Urban Planning and Development* 132, no. 1 (2006): 10-21.

The re-use pessimists therefore observe that such buildings, if they are built on valuable lots, the land price prevails over the value of the building, and such dwellings will inevitably disappear. This mechanism is confirmed by the interviewed real estate agents, especially with regard to the large allotments and residential parks, which continue to attract buyers from a wide regional pool, who are prepared to pay the (rather high) price attached to such neighbourhoods. If the dwelling occupying such a lot is not of a typology suited for contemporary residential standards, the building is quite often knocked to the ground and replaced with a new one. Furthermore, these real estate agents believe in the strength of the villa-concept, which should remain part of the housing supply. Even though large houses may not be sold as quickly as in years past, in the opinion of one respondent it is better to accept that houses will be on the market for several years, anticipating an eventual increase in demand, in reaction to the current shift in housing production towards smaller units in more dense settlement patterns:

> *"I think that, if this densification keeps going on at the current pace, an equally fierce reaction in ten to twenty years might be expected. That's absolutely because of the oxygen shortage* [i.e. the perceived negative effects of living in high density, such as limited private outdoor space, limited privacy] *of people who will have the financial means* [to buy a detached house in an allotment] *at that moment."* (Cools, Immo 2000 Vastgoed)

While subdividing a dwelling is seen by the aforementioned optimists as a viable strategy to provide more housing units in line with future needs, the re-use pessimists do not endorse the idea that such concepts could function in the Flemish context. They are not just sceptical about the concept of dwelling subdivision, but also of co-housing in general. The concept of co-housing, according to architectural theorists Vestbro and Horelli, applies to "housing with

common spaces and shared facilities" which combines multiple dwelling units, inhabited by households without family kinship per se.[46] In the publication following the pilot project housing, the Flemish state architect specifically puts forward this concept as an answer to provide a more sustainable and diverse residential environment, which facilitates social interaction.[47] The pessimists predict a mismatch with Belgian social norms:

> *"Everyone whom I knew to have lived in such a way [in a cohousing project] has had a quarrel, and why? Because a Belgian does not tolerate an invasion of personal privacy, I reckon. That leaves us with a big problem, I think."* (Simoni, architect)

> *"I am a bit sceptical towards this kangaroo housing and care at home. I think this kangaroo housing, to pick up on that, as a form of living together under one roof, doesn't seem very obvious in contemporary society."* (Dierendonck, Dierendonckblancke architecten)

The re-use pessimists therefore do not think that the search for new types of housing should lead to the subdivision of dwellings. This form of cohabitation brings two households too close together, something which does not coincide with the public view on residential quality, which is strongly determined by privacy and individualism. This applies to cohousing in general, and especially to living together under the roof of a traditional single family dwelling. In the introduction to a special issue on co-housing, architect Karin Krokfors explains that even in Denmark, which is considered a forerunner as to the amount of co-housing projects which are realised there, is only limited to one percent of the total housing stock.[48] Also, this low potential impact is used as an argument against:

46. Dick Urban Vestbro, and Liisa Horelli, "Design for gender Equality: The History of Co-Housing Ideas and Realities," *Built Environment* 38, no. 2 (2012): 315-335., 315.

47. Declerck et al., Pilootproject Wonen.

48. Karin Krokfors, "Co-Housing in the Making," *Built Environment* 38, no. 2 (2012): 309-314..

> *"This kangaroo housing, people have been talking about that already for 14 years, and nothing comes of it. Alright, and that's just kangaroo housing... Then there's cohousing, there are people who find it fabulous, and I think it is interesting, but it will not solve this housing demand of 330.000 dwellings, it's just a charming peripheral phenomenon."* (Somers, Bovenbouw architecten)

From a real estate perspective, such housing concepts are furthermore difficult to match with the residential character of low density neighbourhoods. Sharing a dwelling requires clear concepts, envisioning equally qualitative units in order to be marketable. Again, the price of the lot prevails and one respondent argues in favour of the opportunities to gain profit by subdividing large lots into smaller ones, to construct smaller residential units and to lay out smaller gardens. This strategy would provide residential types more in line with contemporary norms, and a profit for the seller, even in neighbourhoods which are typical for their low density:

> *"...the smaller the parcel, the higher the price* [per m²]. *This illustrates the demand for smaller lots."* (Schoeters, Winston Schoeters Vastgoed)

Based on such arguments, these 're-use pessimists' rather perceive dwelling and lot subdivision as an occasionally reoccurring phenomenon, which may offer a specific answer for a specific condition, but is not suitable as an effective strategy to deal with future housing standards and the increasing demands. It is rather perceived, to quote Vermeulen, as a "*survival strategy*" for care- requiring people who have attachments to their residential environment, but certainly not as a long-term solution. In summary, non-believing designers point out aspects why dwellings are inert with regard to adaptation, such as the difficulty of implementing feasible solutions in the complex condition of a built object, each

house having its proper intricacies and flaws. The viewpoints of the interviewed professionals (summarised in table 5.1), on the transformation and subdivision of detached dwellings, be it in positive or negative terms, determine the formulation of strategies in response the contemporary and future housing demand on the regional scale. In the following paragraph, these overall strategic viewpoints are elaborated, and lead to a recalibration of the relation between strategies and scenarios which were formulated as a basis for the interviews with inhabitants in chapter three.

Table 5.1: re-use optimism versus pessimism, professional viewpoints related to technical conditions.

re-use optimism

professional viewpoints	**technical conditions**
* Professional responsibility to address technical and typological flaws; *A demand for smaller dwelling units; *Historical continuity; *Quality of rural living and rural architecture; *Overcapacity of built objects and settlements.	* Central location of a dwelling; * Good structural condition; * The more compact the dwelling, the better the energetic performance; * Retrofitting uninsulated buildings can be advantageous because limited and affordable interventions deliver significant improvements.

re-use pessimism

professional viewpoints	**technical conditions**
* Technical and typological flaws cannot be mended efficiently; * Land price overrules architectural transformation; * Scepticism towards co-housing and sharing a dwelling.	* Remote location of a dwelling; * Poor structural condition; * Uncompact dwellings are more difficult to improve energetically; * Improvement of energetic performance of aged dwellings is too costly; * Mismatch between housing typology and contemporary demand.

Which paths are proposed? Refining design strategies for the residential environment

The first strategic category mainly follows the viewpoints of the *re-use optimists*, and incorporates dwelling transformation as an opportunity to provide in the housing demand. It is mostly defined by favouring interventions in traditional, low density neighbourhoods, focusing on the insertion of dwelling types alternative to the prototypical single family dwelling. The existing local settlement pattern is the main frame of reference and basis for the preconditions of a successful project. The designers who operate within this framework look to rural architecture, its historical origins as well as the morphological settlement patterns which have been grafted onto the landscape, and develop contemporary reinterpretations. Their arguments tie in with the rural dynamism, which is based on small-scale, private initiatives and a *do-it-yourself* (DIY) attitude of inhabitants.[49] More concretely, such design strategies revolve around the safeguarding of the open and green character of small villages, and look for typological improvement on the level of the dwelling. This includes a better spatial organisation in line with contemporary living standards, a higher level of energy efficiency, and an improved relationship with the landscape and the garden. As a consequence, they accept the situation in which they operate not just as a given fact, but as a meaningful foundation for design decisions.

> *"Starting from zero, we have witnessed that already so many times. And we haven't got any real good experiences with that approach any way.* [Interviewer: you are referring to modernist tabula rasa approaches?] *Exactly. It rather is a sort of refinement, to take into account that which is already there."* (De Smet, De Smet Vermeulen architecten)

De Smet illustrates the position of his design office on densification of low-density residential neighbourhoods with the design of a

49. For an explanation of the Belgian DIY mentality, see Bruno De Meulder, and Tania Vandenbroucke, "The Lys-Scheldt Interfluvium: Theatre of Do-It-Yourself," *OASE* no. 63, The Countryside (2004): 110-139; Willemijn Lofvers, and Marcel Musch, "The Countryside," *OASE* no. 63, The Countryside (2004): 2-13.

single family dwelling (**figure 84**). This dwelling is constructed in the garden of an already existing house, and aims to complete the street scene with a compact form. The dwelling derives its formal characteristics from a 'grammar' of rural architecture. Its volumetric organisation recalls the image of the terraced house built in the countryside[50], completed with a backyard extension – although the configuration and the window positioning clearly demarcate it as a detached dwelling. These formal aspects however are used as defining elements for the functionality of this concept on its specific lot. As such, the dwelling refers to its context and is proposed by the designer as a reinterpretation of the qualities such rural architecture has to offer: these are combined with current day energetic demands.

50. The terraced house is actually a typically urban type, which however has been introduced to the countryside as a result of the First Belgian housing act of 1889, and is now a common sight even 'out of town.' See Bruno De Meulder, Jan Schreurs, Annabel Cock, and Bruno Notteboom, "Patching up the Belgian Urban Landscape," *OASE* no. 52, Consumption and Territory (1999): 83-84.

This strategy is in line with the bottom-up strategy focusing on *reconfiguration* as explained during the interviews. The application of reconfiguration strategies is also seen as an opportunity to change the relation between the dwelling and the lot. The development of a multi-family dwelling unit instead of a traditional one, be it by renovation or by new construction, using the existing building footprint as a basis, can also limit the proliferation of private infrastructure, such as driveways and sewerage, which are costly elements. In response to the presented incremental densification, municipal planning officials who responded positively, did so because this approach safeguards important characteristics ascribed to such areas: Open space, a screen of foliage hiding the building partly from sight. Each property has a comparable functional profile, including greenery and leisure facilities. Furthermore, the outlook of a traditional detached dwelling is maintained in terms of scale and volume, which illustrates how municipalities also adhere to the continuation of persistent traditions.

> *"Subdividing villas into two dwellings, as you show here, that makes little spatial difference. That should be allowed."* (planning official Wortegem-Petegem)

And further, with regard to standards of dwelling size to adhere to:

> *"This would require a RUP* [Spatial Implementation Plan]. *Particularly to safeguard housing quality, in order to make sure that dwellings will not become too small."* (planning official Lubbeek)

Quite exceptionally, the municipality of Vorselaar, together with the IOK[51], is working on the development of a plan for the municipality which explicitly includes dwelling subdivision as a prime strategy. This rural municipality has only one housing core, and a pressing lack of construction land. The plan proposes to subdivide this core into several layers, determined by density and history (**figure 85**).[52] The outside layer, consisting mainly of detached dwellings, is considered to have potential for finding alternatives for new allotments:

> *"So, to redevelop everything by means of new construction, I do not think that will be necessary. (...) Those* [residential] *typologies are spacious enough to consider densification without changing the way it* [the dwelling] *looks. It* [the dwelling] *should still look like one single family dwelling, but destined for two households."* (Vaes, IOK)

The subdivisions should therefore uphold the outlook of small residential pavilions in a landscape of private gardens. The strategy includes instruments to capitalize sizeable individual lots, without altering the concept of private landownership. This feasibility does not solely depend on the technical state and organisation of the dwelling, but also on whether the local municipality will cooperate in the search for a proper transformation of a specific dwelling in a certain neighbourhood. An interesting proposal was to consider the design process not strictly as a bottom- up process, but rather as the development of a municipal vision for development of certain neighbourhoods, in such a way that the

51. IOK stands for Intermunicipal Development Agency for the Campine region. This is an *Intercommunale,* which are intermunicipal utility company with state and/or private participation: a typical Belgian institution, which takes over tasks from municipalities within a region, among which spatial planning.

52. Municipality of Vorselaar, and IOK, "Gemeentelijk Ruimtelijk Uitvoeringsplan Kern Vorselaar", municipality of Vorselaar, (2014) <http://www.vorselaar.be/inhoud/rup-kernopenbaar-onderzoek> [Accessed 28 March 2014]. The preliminary version is approved by the town council and is deposited for general inspection between 7 March and 5 May 2014.

municipal planning official can outline possible dwelling options as an advice to inhabitants and buyers. At present, spatial planning officials do not assume such a role.

> *"Usually, the client wonders: What can I do* [with this property] *and what can't I do? Therefore, it would be very interesting (...) if the municipal planning official could present a sample sheet, and if the official could present a number of scenarios."* (Heynickx, architect)

Going one step further, even the concept of privacy can be softened. Privacy in this context refers to the condition of living in one's own property, which is designed to keep the personal domain out of the view of those in the public domain, such as the passerby, or the neighbour, a notion which is now strongly attached to residential neighbourhoods consisting of detached dwellings. The designers who support the process of incremental readjustment also propose to smoothen this strict privacy by introducing other shared land property, resulting in collective land usage as alternative spatial types in a parcelled landscape. Such proposals tie in with the concept of *collaborative* housing[53], since not a habitation but only a garden is shared.[54]

> *"Here,* [in the discussed drawing] *I see them too, those boundaries. If those boundaries could fade, then I think that would be perfect. Think about all the space for playing, all the opportunities for interaction between children."* (Swartenbroux, PULS architecten)

This set of strategies is characterised by a continuation of current-day legal instruments and design traditions, preferring these over radical solutions, breaking with tradition and history. This is explained by Geels and Schot as a *transformation path*, which occurs mainly by a reorientation of the dominant regime.[55] This reorientation occurs through gradual awareness among regime

53. Krokfors, "Co-Housing in the Making".

54. See also Dolores Hayden, *Redesigning the American dream : the future of housing, work, and family life* (New York: Norton, 1984), for an example of such collaboration in the context of the United States.

55. Geels and Schot, "Typology of Sociotechnical Transition Pathways", 406.

actors of changing societal needs – for example, inhabitants, designers, and planning officials get acquainted with alternative housing concepts and the future housing demand, and seek to resolve such issues within the ruling framework of regulations and housing production processes. But what if such subdivision processes would be extrapolated to a higher level? Would entire neighbourhoods transform, or just carefully selected dwellings and lots? Designers opposing this strategy, expressed their fear of a subdivision process growing out of control, which in the end would lead to aggravated problems. Peter Vermeulen therefore criticised the reconfiguration strategy, because of the expectation that small-scale, bottom-up initiatives would be eclipsed by undesired market speculation. Also, not every lot or dwelling will be suitable for subdivision. This strategy therefore is expected to lead to unequal value criteria for diverse kinds of properties, which under current conditions fall in the same category. Hence, there is a risk that benefits will be accessible disproportionately. Lastly, how can this reconfiguration process be kept under control, and when does it end? A process of small-scale densification also has the risk to lead to loss of open and green quality.

Secondly, the discussion of the top-down scenario, involving *replacement* of dwellings and large-scale initiatives of government and private developers, led to the involvement of criteria related to mobility, diversity, and scale. As such, this strategy should, according to those designers considering it, be implemented selectively. Development should occur in line with a strict planning policy differentiating between spaces with potential for densification in the Flemish *Nevelstad*[56] and places which rather should not be densified further. Mobility plays a significant part, but two approaches can be distinguished. The first approach considers mobility as an important condition for redevelopment, while the second approach defines mobility as a driving concept behind development. Designers who work according to the first approach, argue that large parts of the Flemish territory, mainly

56. Michael Ryckewaert translates this typical Flemish concept as *fog city*, referring to the diffuse urbanisation pattern of the region. See Michael Ryckewaert, "The Minimal Rationality of Dwelling Patterns in Flanders' Nevelstad," *OASE* no. 60, Urbanism out of Town (2002): 49-60. For a full explanation of the concepts of dispersal and compactness, see chapter three of this dissertation.

within the Flemish Diamond[57] are considered to be well-connected to transport networks. Designers following the second approach propose a network of transport nodes, where densification should grow from, and should be developed as closely as possible to these nodes.

Furthermore, diversity is seen as a key to improving the housing stock. Designers acknowledge that this involves looking for new typologies and ways of building, which especially address the rural condition. Rural living is considered as a constant factor, which is in essence characteristic to the Flemish view on good housing, and therefore needs to be taken into account.

> *"There are people who want to live in such an environment, but who do not have the money to pay for this or this* [referring to detached villas]. *It's just that there is a difference between someone who wants to live in the city, and someone who wants to live amidst greenery. It's like that. So, both opportunities should exist."* (Swartenbroux, PULS architecten)

> *"I am very much in favour of searching for a form of dwelling in a rural environment which is more sustainable (...) and I am in favour of the opportunity to improve an existing residential area, if it's not functioning well at the moment."* (Geenen, WIT architecten)

Among municipal spatial planners, there was a common scepticism about the addition of amenities and also more dense housing outside of municipal cores (and often also with regard to densification within the cores). One exception was found in the viewpoint for the municipality of Overijse, a municipality in the Flemish ring of villages around Brussels, where the escape of residents from the capital, and their preference for the surrounding suburban residential environment, is strongly felt. Here, the

57. The Flemish Diamond is the urbanised area between the cities of Antwerp, Brussels, Ghent, and Leuven. Louis Albrechts, and Griet Lievois, "The Flemish diamond: urban network in the making?," *European Planning Studies* 12, no. 3 (2004): 351-370; RSV, "'Ruimtelijk Structuurplan Vlaanderen', Flanders spatial Structure Plan", ed. by Ministry of the Flemish Community MVG (Brussels, 1997): http://rsv.vlaanderen.be/nl/index.html, [Accessed 10 November 2011].

planning official expressed a positive reading of diversity housing types and amenities in accessible areas, such as along main ribbon developments. Also, the smaller hamlets in the municipality were subject of planning projects in order to allow for development in their historical centres, which is illustrated with the case of Maleizen, a small hamlet within the municipality (see also **figure 12**):

> *"We specifically want to fix the presence of core amenities in that environment with the RUP. (...) If you fix that, you can create a critical mass in one place, so that it will become and remain liveable."* (Planning official Overijse)

The conditions with regard to scale infer that designers who are operating on the basis of this strategy look for opportunities to implement elements which diversify the built infrastructure with larger elements. In some discussed projects, where a low density of the existing built fabric allows for it, single family dwellings are partly replaced with other building types, such as terraced housing, apartment blocks and slabs. This change of course would allow for a breach with the prototypical private fenced lot in a more rigorous way than in the aforementioned strategy. Open space obtains a collective or public connotation, and obtains more functionality than in a traditional allotment, where the public domain is primarily defined by roads designed for motor vehicle accessibility. Designers working with this strategy perceive this increased functionality and expansion of housing diversity as a viable way to facilitate 'ageing in place' preferable to the transformation and sharing of smaller residential units.

> *"I would see more advantage in the adding of public space. So, a number of detached dwellings is safeguarded, and new public space is realised by making a part of the lots communal, (...), and in another place, maybe two lots are joined together. On these lots, a fairly high* [residential]

> *density can be realised, in such a way that this open space, this new public space, supports this high density. And this mix that will come into existence, yes, that could be a line of thinking."* (Dierendonck, Dierendonckblancke Architecten)

As such, this approach is based on the insertion of large scale elements in a traditional, fine-grained allotment tissue. In cities, well-structured processes of urban redevelopment are already ongoing, while smaller municipalities lack the ambition, the know-how and the governmental apparatus to properly manage such processes, as was remarked by respondents Vaes, Somers and Dierendonck. Such rural development processes hence need to be brought in line with the knowledge level of urban development processes.[58]

This intervention leaves some of the existing dwellings intact, and as such results in a hybrid urbanised space. A focus on the process can be illustrated by the position of the two designers who also contributed to the Pilot Project Housing. Their projects incorporated a process-view on densification by means of the insertion of large-scale building typologies; Somers proposes a *systemic* approach, in which opportunism determines where and when an intervention is done, which excludes that other insertions are being made in the direct vicinity. This proposal is based on the implementation of a process which will be set in motion by the initiatives of owners, who are enticed by the conditions of this systemic condition to redevelop their property in a renewing manner. The role of the designer will be to provide his or her services in facilitating these bottom-up developments, rather than setting the conditions top-down by projecting a masterplan for a certain location. The authors of this proposal[59] argue that such a process could reformulate the connection between dwelling and landscape, which has been lost as a result of the suburbanisation process (**figure 86**).

58. As documented in Loeckx, *Framing Urban Renewal in Flanders*.

59. Designated as Team_03 in the publication of the Flemish state architect. The team consisted of Bovenbouw architectuur from Antwerp, and the research groups Labo S and Labo A of the Department of Architecture and Urban Planning of Ghent University. See also Declerck et al., *Pilootproject Wonen*, 30-41.

The project co-authored by DierendonckBlancke architecten presents large scale building typologies in an existing tissue, which can gradually develop a residential zone from a low-density starting phase to a high-density final phase. The design team[60] proposes as such the image of a "new neighbourhood" which would be achieved. Gradual demolition of row houses in social housing neighbourhoods would be followed by gradual construction of urban building types, such as compact apartment blocks, complete housing blocks, and linear building configurations (**figure 87**). The most complete intervention, resulting in the most dense phase is not per se the finality; the neighbourhoods could also become hybrids combining old and new typologies. Dierendonck uses terms such as *injections* or *parasites* to explain this concept. The parasite, in architecture, has been used as a metaphor for a building which is a relative small intervention which radically alters its environment. As such, a parallel is drawn with a resilient organism which thrives on, and alters, a host body.[61] The use of such metaphors in the context of Flemish allotments illustrates how these architects propose projects as products developed within a radical niche, which would alter the sociotechnical regime, in contrast to the gradual development of the previous strategy. Also, this readjusted scenario involves elements of *reconfiguration*, as radically different urban objects alter the conditions for surrounding houses, which could also be redeveloped under the altered conditions.

Finally, the third discussed scenario, revolving around *removal* as a result of a decreasing demand and a focus on compactness with a significant role for the governement, can be recalibrated. Macro scale arguments come to the fore as determinants of a development in line with this strategy, which mainly excludes the re-use of existing dwellings, and which involves also the *unbuilding* of certain areas, if they cannot properly cater to contemporary housing demands, because of a remote location or a lack of architectural and physical performance. Striving for demolition in certain areas, as was explained in the interviews throughout the research project,

60. Designated as Team_01 in the publication of the Flemish state architect. The team consisted of Dierendonckblancke Architecten, L.U.S.T. Architecten, and Haerynck Vanmeirhaeghe architecten (all working from Ghent). See also Declerck et al., *Pilootproject Wonen*, 8-19.

61. See for examples of how designers use the term parasite in a positive manner: Anneke Bokern, "Parasitic architecture," *Topos: European landscape magazine* 42, no. March (2003): 52-57; K Architectures, "Parasites," *Arch plus* 133, no. September (1996): 24-27; Mechtild Stuhlmacher, "Afterparty - Afterparasites," *OASE* no. 67, After the Party (2005): 121-125.

invokes many critiques, but a number of designers consider this inevitable, and plea to involve the possibility of such a scenario in spatial planning. These designers do not consider it as an active strategy, but as an anticipated result of macro-scale developments such as decreasing property value, exacerbated mobility problems, and regional shrinkage. In other words, densification in viable regions will inevitably induce the shrinking of other regions, and the government, and spatial planning professionals, should guide this process of shrinking:

> *"That will happen! So you have to make something beautiful out of it."* (Vermeulen, Stramien)

Geels and Schot describe such a process as a *technological substitution,* which occurs at the moment of a specific shock in society, rendering a current regime inadequate, while at the same time at the niche level, alternative approaches have been sufficiently developed to replace this regime.[62] The shrinkage in areas relatively remote from urbanised centres is also expected to occur because of the lack of quality some designers perceive in the built environment. The mediocre performance in energetic terms and the inflexibility of detached dwelling types are seen as a basic reasons for many dwellings not to stand the test of time. As such, designers foresee that many of the detached dwellings and low density residential neighbourhoods will at some point become obsolete: as a result of demographical developments this obsolescence will be socially constructed.[63] Replacement of housing units could occur in other, better located areas, and dwellings, for example in areas under threat of flooding, could disappear over time. While this scenario is still seen as a future development awaiting macro-scale developments, there are a number of design criteria for removal which were put forward:

62. Geels and Schot, "Typology of Sociotechnical Transition Pathways", 409-410.

63. As explained in Keith Kintrea, "Housing aspirations and obsolescence: understanding the relationship," *Journal of Housing and the Built Environment* 22, (2007): 321-338.

> *"I think this cannot just be done arbitrarily, you need well grounded reasons for this, and see whether it is a suitable scenario for a given place (...) This is based on a different reading; such as a reading of landscape value, or maybe of an allotment which is causing a rupture in the landscape. This could be good reasons."* (Geenen, WIT architecten)

Demolition is not on the agenda of the municipalities, although protection of vacant land is. In several municipalities, officials presented initiatives to safeguard green space from ongoing construction, some more successful than others. The sought after strategies are somewhat more cautious than the presented unbuilding. The planning official in Aartselaar referred to the ratification of a RUP which removed the label of *construction land reserve* (which was fixed in the regional zoning plan) from an area called *de Reukens* which is a green spot on the map of Aartselaar, enveloped by allotments and ribbon developments. In it lies the source of a small creek which ties ecologically valuable reserves, beyond the municipal borders, to one another: the area also ties in with the provincial natural structure. This area will be protected from further colonisation by dwellings, which infers that a reserve area for housing (as defined by the regional zoning plan) and the agricultural land lose this functional designation (**figure 88**).[64] Although some dwelling had already been constructed in this area, the plan does not go so far as to propose expropriation or demolition. The official explained how this relates to the development policy of the town centre:

> *"In fact, we reformed that entire area, with exception of the dwellings on its edges, entirely into a recreation forest. Now, that's a step, by means of which we mean to express, that we actually want construction happening in the town centre."* (planning official Aartselaar)

While it is considered destruction of capital, there are also

64. Iris Consulting, "Gemeentelijk Ruimtelijk Uitvoeringsplan De Reukens Aartselaar, Toelichtingsnota", municipality of Aartselaar, (2012) <www.aartselaar.be/content/114> [Accessed 18 November 2013].

arguments to do so on a municipal level, on a small scale, as a process of land consolidation, where owners of singular, rural built object may exchange their property for a more centrally located lot, where there is an opportunity for densification:

> *"So, if you would find a way to implement a sort of mechanism, which incites me to demolish my house, and in the village centre, as a consequence I may build such and so. Within the same village, I could believe in such a process, but if you try to organise this on a Flemish level, removing a lot somewhere, and considering all the damages and benefits caused by planning.... oh dear, no, nothing will come of it"* (Somers, Bovenbouw architecten)

While the notion, that too many dwellings have been built in the wrong locations, is widely accepted among the interviewed designers, a process of unbuilding is mainly received critically by opposing designers, who define it as utopian, unattainable or cynical.

Based on these reported viewpoints, the three scenarios elaborated thus far require readjustment, which mainly involves an interdependency of concepts and strategies (see the overview in **figure 89**). Especially the arguments and strategies of re-use optimists and pessimists come together in a redefined scenario combining reconfiguration and replacement strategies. Furthermore, the *removal* strategy is bound up with *replacement* strategies which are suited to stimulate development in a well-suited area to be able to offer housing alternatives which could draw inhabitants from ill-suited residential areas. The distilled scheme will be elaborated in the concluding chapter.

Resistance against change: how does obduracy manifest itself?
All three transformative processes deal with space which is already inhabited, which is already claimed and bound by regulations.

Either one of the discussed strategies will face certain difficulty for implementation, which entails that a scenario defined by maintenance of the status quo needs to be considered. As Hommels has argued, sociotechnical change is a complicated process which involves diverse factors, and cannot be simplified in terms of just one aspect, like costs, indecisiveness, power relations, or materiality.[65] This section proposes a similar, profound conceptualisation of the obduracy of the Flemish, low density residential environment by means of comparison of documented resistance against the implementation of alternative plans, and arguments favouring the status quo in low-density residential neighbourhoods. The arguments put forward by professionals and specialists, reflect opinions and viewpoints which were brought up by inhabitants, as discussed in chapter three. This is particularly clear in the influence of local politics, a factor mostly mentioned by planning officials as a main reason behind the resistance against changing low-density residential environments. The studied municipalities are characterised by a large share of detached dwellings, and thus inhabitants of these dwellings constitute a significant part of the electorate of local politicians in office. Especially in wealthy municipalities, where the densities are lowest and the dwellings biggest, this part of the electorate weighs heavy on planning decisions:

> *"Our departments have been working for years on a legislature* [concerning the spatial planning of the local residential forest]*, but we can't get this off the ground. (...) It's about property of not just anybody, of course."* (planning official Sint Martens-Latem)

What follows is a discussion of specific elements of obduracy and resistance towards the typical strategies of each of the discussed strategies, in terms of legislative, technical, social and cultural factors.

65. Hommels, *Unbuilding Cities*, 19-20.

Because the first scenario, involving a reconfiguration strategy, considers a bottom-up development of residential neighbourhoods, and involves also the decision to either work towards adaptive re-use of detached dwellings or towards demolition and new construction, technical adaptations and financial consequences are of primary concern. Gillekens stated that transformation of dwellings is often preferred to demolition followed by new construction, because of the different VAT rates: 6% for renovation versus 21% for new construction.

> *"This infers that people are financially compelled to keep older dwellings and renovate them, in fact at high costs, and this also involves a very big effort to bring the dwelling in line with standards of energy efficiency."* (Gillekens, architect)

The prospect of the *European Energy Performance of Buildings Directive*[66], imposing the construction of 'nearly Zero-Energy Buildings' from 2021 onward, will also have its impact on re-use, since it will be difficult to develop a competitive renovation project if new buildings adhere to a higher level of energy efficiency. In Flanders, the official norm still needs to be determined[67], but are associated with the concept of the Passive house, originating from the German *Passivhaus*.[68]

> *"Soon.... new construction should adhere to the passive norm. (...) If one has to apply this for an older dwelling, well, you opt for demolition, right?"* (Simoni, architect)

The comparison of these two arguments demonstrates that, financial and fiscal assessment is expected to change due to macro-developments in European and regional housing policy. While renovating a dwelling currently might still be considered feasible, as the qualities which are obtainable are rather close to the qualities of a newly constructed building, stricter building standards will result that the balance, in the viewpoint of an architect advising a

66. European Parliament, and European Council, "Directive 2002/91/91EC of the European Parliament and the Council of 16 December 2002", (Brussels: European Union, 2002).

67. Vlaams Energieagentschap (Flemish energy Office), (2013).online: http://www.energiesparen.be/node/3618, [accessed 31 July 2013].

68. Wolfgang Feist, Jürgen Schnieders, Viktor Dorer, and Anne Haas, "Re-inventing air heating: Convenient and comfortable within the frame of the Passive House concept," *Energy and Buildings* 37, no. 11 (2005): 1186-1203.

client, tips towards unfeasibility when comparing renovation and its limits to the opportunities of new construction.

Existing zoning plans keep determining how existing buildings are being replaced. De Smet illustrated the difficulty of introducing alternative residential typologies, with the example of a bungalow type, which was designed to be built in the backyard of a detached dwelling. The allotment plan foresees an optional right to construct a garage, and the designers used this as an argument in their design logic. The project however found no approval from the municipality exactly because of the designation of space for a garage (**figure 90**). In the case that owners choose to demolish and rebuild a malfunctioning building, zoning plans organise the renewal by means of a continuation of the same spatial logic. This condition is confirmed by real estate agencies, who state that they sell property to people who exactly chose to live under such conditions. Such agencies worry about the clarity of zoning regulations and testability of construction proposals, in the context of a landscape filled with very diverse houses. Inhabitants tend to see these rules as the basic condition, for which they have consciously opted at the time of purchase.

> *"Such property development practically includes a kind of contract, and a certain equality, which is very difficult to breach. Consider asking the question: who obtains the privilege to do something more or something different than someone else? Either it applies to everybody, or it applies to nobody."* (Somers, Bovenbouw architecten)

The strategy of diversifying existing neighbourhoods by implementing alternative housing types resulting in higher density, even more has to deal with this resistance. This can furthermore be ascribed to differing viewpoints as to which kind of urban tissue would be suitable for densification. In the view of designers, zoning plans hamper the structural development of

residential neighbourhoods from a low-density, monofunctional area into a higher-density area including amenities. They are used by inhabitants to reinforce the obduracy of their residential environment, as they prefer not to see change until they move away themselves. Dierendonck explained that this is also the reason to project their design for the pilot project on neighbourhoods where ownership is in the hands of one, single social housing corporation. Dierendonck does stress, that the developed strategies are also valid for the typical allotments, but with greater difficulty:

> *"... it is a complex theme, because of the property structure in the allotment, which is some sort of many-headed monster. The fact is that a town council can cancel the zoning plans. They have that power, which is rarely exercised however, and they could use it to increase the overall density. (...) That is something which certainly would be possible, but which rarely occurs nowadays, because of the culture of holding on to the privately owned parcel."* (Dierendonck, Dierendonckblancke Architecten)

The viewpoints of designers who propose to accept the condition of the Flemish nebulous city, the *Nevelstad,* can be clearly distinguished. Both of the interviewed contributors to the Pilot Project initiative of the Flemish State Architect propose to invert this focus on the town cores. According to Dierendonck, densification in low density areas, close enough to these cores, would safeguard the historical village centres against a harsh metamorphosis. Somers further argues that, in the nebulous condition of the Flemish Diamond, densification in the town centres isn't even in line with a good mobility policy, since traditional towns have lost their connotation of centrality, and have a more accessible periphery. In addition, both De Smet and Heynickx, have expressed disapproval of the typical densification which has been occurring in many small towns and villages in Flanders, where the traditional centres have seen the implementation of apartment buildings which have

a strong impact on the historical and traditional outlook of these cores. Such professional perspectives deal with inertia which is defined by the concept of centrality, and which is maintained by the planning strategy and instruments which are used in most of the smaller Flemish municipalities. As a result of this focus on centrality, also the obduracy of low density neighbourhoods is confirmed, as the planning apparatus is used to protect the low density and the residential typology characteristic of areas such as residential forests, and attribute the capacity to safeguard the forest to the detached dwelling, granted that it is built on a spacious lot.

> *"Well, we strive to maintain the green character, and try to discourage fragmentation. We're talking about a [preferred] density of 3 to 5 dwellings per hectare"* (planning official Sint Martens-Latem)

Especially the third strategy, the ambition of unbuilding certain areas, is faced with a strong resistance which can be explained mainly in terms of the institutionalised character of residential neighbourhoods, the monetary value of the property, which is expected by inhabitants to partially provide a pension after retirement, and the ongoing process of building new dwellings in existing gaps in allotments and ribbon developments. From the perspective of a municipality, the desirability of such a residential environment as well as the investments in infrastructure which are already made, validate to keep sprawling settlement patterns in place:

> *"Well, those ribbon developments are simply in place (...) I don't think you should provide more open space there, because all utilities are already in place, and so I think they should be put to proper use within their context, (...) there is still a certain demand within those ribbon developments, and there certainly is a demand for rural living."* (planning official Lummen)

This leads designers to confirm their assumption that change will occur only after contemporary problems on the macro level, such as flooding, traffic jams or decreasing value of detached dwellings, are exacerbated. They explain the concept of inertia of residential neighbourhoods in the following terms:

> *"...I don't see how to get rid of these areas? So if you ask me if it is feasible to maintain them... I think we're stuck with them. It is also institutionalised, the fact that you can't just get rid of them."* (Geenen, WIT architecten)

With regard to property value:

> *"If we decide now to tamper with the reserves of savers [referring to the 2012-2013 Cypriot financial crisis], then there is trouble on the rise, and the same goes for tampering with property, and that's just."* (Vermeulen, Stramien)

And with regard to the functional label of land:

> *"Also, I think it will be very difficult to part with the label of building land, and to initiate a reverse development."* (Dierendonck, Dierendonckblancke Architecten)

Also real estate agents argue against such a strategy, as they note a scarcity of vacant building lots in their work field. They commonly oppose the loss of building lots. Still, within some municipalities, the government has taken the initiative to halt further sprawl by buying out building lots, as was confirmed by the planning official in Alken, with regard to the local ribbon developments, and the alderman of spatial planning in Keerbergen, who explained, with regard to the vast residential forest, the permanence of building rights as an endangerment for the policy to safeguard green and public space:

> *"So within the residential park, the municipality purchased a number of parcels, which are currently publically accessible, but are still designated as residential zone in the regional zoning plan, but we don't have the intention to subdivide these terrains. This brings tension between us and the Flemish government, who is urging us to make an inventory of municipal property (...), in order to place these terrains on the market."* (Alderman of Keerbergen)

A similar discrepancy due to conflictive planning levels is mentioned by the planning official of Wortegem-Petegem, who acknowledged that the municipality had not succeeded in its ambition to focus on densification in the centres as an alternative to ongoing construction of dwellings in the ribbon developments. She pointed out the discrepancy between the municipal spatial structure plan – the official document which stated this ambition – that proved to be a paper tiger compared to the regional zoning plan, which has more legal force. The municipality could only accept further densification of rural ribbon developments. Policy documents appear to be highly conflictive, and in this confusion, a continuation of the traditional, individual mode of housing production is the result. This has also been summarised by Somers:

> *"Using the apparatus of urban development, like the urban plan, or the RUP, to fight sprawl, yeah, well that means to fight a losing battle."* (Somers, Bovenbouw architecten)

It is ironic to see that this RUP is the major legislative instrument of the municipality to work towards spatial transformation. If the development of a RUP is not possible – establishing one is costly and time consuming – then, the regional zoning plan determines the course of action, and these plans appear to stimulate business as usual with regard to the production of housing.

Table 5.2:overview of strategies, concepts and resistance

	Focus on reconfiguration, incremental development	**Combination of reconfiguration and replacement with other building types**	**Focus on centrality unbuilding as a consequence of macro-scale developments**
Existing detached dwellings	Re-use optimism:	Re-use optimism as well as pessimism	Re-use pessimism
Underlying concepts	Traditionalism; Preservation; Rural architecture.	*Nevelstad*; Diversification of housing types, functionality, and building scales.	Compact City; (Poly)centrality; Mobility; Landscape values; prospect of obsolescence of detached dwellings.
Proposed strategies	Improving typological and technical conditions Dwelling subdivision; Shared lots; low-rise densification; maintaining the outlook and qualities of rural and suburban housing.	Selective demolition and insertion of alternative housing types and large-scale built objects; reinforcing landscape, collective and public space; systemic/ parasitic strategies	Selective Mid/low rise densification; Development close to public transport nodes; Safeguarding of green space with planning instruments.
Design pathways	Transition from within regime.	'paper architecture' proposes an alternative course (niche level).	Strategies await macro-developments (niche level).
Arguments for resistance	Energy norms; Zoning plans; NIMBY arguments of inhabitants; uncontrollable mechanism.	Zoning plans; Small ownership; concepts of centrality and compactness.	Property value; Continued demand for nonurban housing; (lacking) capacity of RUP's.

Table 5.2 provides a conclusive overview of the three discussed strategies and concepts which architects and planners use in their practice, and the resistance against implementation of these concepts.

This analysis brings forward arguments, which outline a broad conception of the obduracy of Flemish low-density neighbourhoods, which can be identified with help of the three conceptual models proposed by Hommels.[69] All three strategies face an obduracy of low-density neighbourhoods based on similar arguments, which point towards a persistent tradition. The current housing system is also *embedded*, in the sense that property, value, technical norms and building quality inhibit transformation of the housing stock or implementation of alternative typologies in low-density neighbourhoods. Furthermore, this difficulty also lies in differing professional *frames* of municipal planners and designers: planners operate within the lines of policy, while architects look for, and beyond, the boundaries of policy.

The system of sprawl, inertia, and (radical) interventions.

As explained in the introduction, sprawl can be read as a systemic process. Poelmans and Van Rompaey have attempted to model this sprawling system, showing in what way its continuation would have an expansive impact on the landscape in the future, and identify "accessibility and neighbourhood interactions" as main determinants.[70] These geographers acknowledge that local, specific situations, like municipal policy and landscape qualities, are also strong determinants which however cannot be incorporated in their model. Another important factor which is omitted in such a reading of sprawl as a systemic process is the agency of actors involved in the design and planning process. The role such actors assume, and which is documented here, shows how they contribute to ambitions of improving the built environment, and, in their daily practice, deal with elements of obduracy when giving form to these ambitions in their spatial practice. Concretely, designers

69. Hommels, *Unbuilding Cities*, 35.

70. Lien Poelmans, and Anton Van Rompaey, "Detecting and modelling spatial patterns of urban sprawl in highly fragmented areas: A case study in the Flanders–Brussels region," *Landscape and urban planning* 93, no. 1 (2009): 18.

and planners develop projects which follow critical threads, some moderately and others fiercely, with regard to the Flemish housing model, addressing its environmental, economical and social sustainability. The desirability of a detached dwelling in a green environment however remains persistent, and local politicians are attributed power to safeguard these residential environments. Planning officials directly deal with these power divisions in the planning practices of their municipality. In the singular case of Vorselaar, where subdivision is stimulated, the local planning official has to admit that such alternative concepts do not find fertile soil with the inhabitants, who still prefer a detached house.

The discussions of which this chapter has reported, illustrate the urgency for and the capability of designers to explore diverse trajectories for designing, both careful and progressive. Arguments derived from the local discourse on sustainability are emphasised in different ways: the investments required for energetically retrofitting dwellings are either seen as a reason to simultaneously improve the typology of the detached dwelling, or are considered insufficient compared to the issue of exhaust and energy consumption which are connected to sprawling settlement patterns. Michel Foucault thought of the architect as a person which is unlike professionals "through whom power passed or who are important in the field of power relations".[71] He argues that an architect may build a house, but afterwards has no power over the client who may want to adapt the house. Hence, the architect is considered a professional lacking a similar level of continuous control as a doctor, an engineer, a priest or a judge have over the systems they manage. The results as presented in this chapter, however show how architects and planners assume a knowledge and experience-based agency, which outlines how alternative pathways towards a change in the housing production can be pursued, which goes beyond their act of developing designs.

71. Michel Foucault, and Paul Rabinow, "Space, Knowledge, and Power," in *The Foucault Reader*, ed. by Paul Rabinow (Harmondsworth: Penguin Books, 1984): 247.

Even ardent advocates of radical approaches to housing production, combine their zeal with (re)design of single family detached dwellings. To illustrate, Flemish state architect Peter Swinnen has been a driving force behind the search for more collective housing forms in the *pilotproject housing*, while his architecture firm 51N4E, has delivered the redesign for a typical, large *fermette* style dwelling for two inhabitants, the *Arteconomy house*.[72] Also the recently appointed president of the FAB[73], Leo van Broeck, has made a plea for rigorous densification in the form of high-rise development, while his office has accepted and finished the brief for renovation of a detached dwelling in a suburban environment, the *total makeover house*.[74] From the interviews conducted with designers it also becomes clear how multiple design strategies are staged, both in line with current conditions and as proposals how these conditions may change in the future. Macro scale development processes such as demographics, price mechanisms or top-down building regulations, are considered as prospective conditions to which appropriate responses already require attention. These strategies, especially if they are based on a critical reading of building practice, do not necessarily fit with the actual building practice of the designers. This ambiguity is described by the French architectural historian Antoine Picon as the natural state of architecture, which always reproduces society, and simultaneously looks for a new ideology to adapt society.[75]

This duality is certainly applicable to Flemish residential environment, and explains what role the existing stock of detached dwellings plays in contemporary architecture and planning. This analysis points out that there are multiform aspects which point out obduracy of the detached dwelling, explaining the difficulty of intervening in the residential environment; this side of the duality relates to built objects, and the way professionals act in response to these artefacts. Despite the positive disposition some of the designers have towards housing subdivision, they discuss having difficulty implementing such concepts because of the

72. Stefan Devoldere, "Een Aangepast Woonkader," in *Radicale Gemeenplaatsen. Europese Architectuur Uit Vlaanderen. Architectuurboek Vlaanderen N°10*, ed. by Ilse Degerickx, Aglaée Degros, Maarten Delbeke, Stefan Devoldere, Christoph Grafe, Elke Hoornaert, Christian Kieckens, André Loeckx, Dirk Somers, Axel Sowa and Ellis Woodman (Antwerp: VAi, 2012): 162-175.

73. Federatie van de Architectenverenigingen van België vzw (*Federation of Architectural Associations in Belgium*).

74. Leo van Broeck has explained his viewpoint in an interview with the Belgian newspaper *de Standaard:* Geert Sels, ''Erfgoed is overgewaardeerd': architect Leo van Broeck, geneesheer van een ziek ruimtegebruik ', *De Standaard*, 04-05 May 2013, pp. c10-c12. The project *total makeover house* can be found on: Van Broeck and Bogdan Architects (2013) http://www.bvbarchitects.com/#/?cat=projects&page=21 [accessed 25 September 2013].

75. See the interview with Antoine Picon conducted by Isabelle Doucet and Kenny Cupers in: Scott Lash, Antoine Picon, Kenny Cupers, Isabelle Doucet, and Margaret Crawford, "Agency and Architecture: How to be Critical?," *Footprint*, no. 4 Spring (2009): 7-20.

limits of regulations and laws. When looking at the situation of single townships, municipal spatial planners are bound by the framework of superimposed policies and local politics. As was explained, this may reinforce a certain obduracy designers face. Among officials, limited experience with alternative dwelling types outside of the historical cores was recorded. As a result, architects working on projects in low-density areas in the periphery of towns and villages are limited in their options to the reproduction of traditional dwelling types, while they themselves perceive potential in this regions for densification, in order to safeguard the valued historical village centres from alienating housing production. Such arguments studied here point out a divergence between an approach facing this obduracy head on (for example the design of a transformation of a dwelling, or of an entire low-density neighbourhood), and those projects which accept the obduracy (for example, densification of urban centres, which provides competing housing types, indirectly devaluating – and deconstructing the obduracy – of detached houses).

Hence, diverging attitudes towards this obduracy on the level of the object, demonstrate how diverse transition pathways are being developed simultaneously on the level of professional culture. In line with the multi-level perspective of transition management[76], reproduction and reformulation occur in diverse situations, either from within an invested regime or from a radical niche of design thinking. The case-specific approach of architecture leads to various, jointly evolving trajectories of adaptation, rather than the continuation of one determined pathway. Therefore, the importance of interaction between modest and rigorous interventions requires emphasis.

To start with feasible re-usage of existing detached dwellings, as comes to the fore in the documented viewpoints, this approach strongly depends of the quality and value of the existing dwelling and its environment, and on local conditions. Re-use mostly

76. Geels and Schot, "Typology of Sociotechnical Transition Pathways".

should be seen as a very specific, tailor-made solution to a specific demand, rather than a significant solution to address the housing demand of coming decades. This reinforces the conclusion drawn in the previous chapter, stating that only few dwellings were encountered which demonstrate a convincing form of flexibility. The obduracy of spatial patterns and the persistence of demand for semi-rural living ensures a continuation of this housing model, which is picked up by designers both in positive and in negative terms.

Rigorous replacement of dwellings by alternative housing types comes to the fore as a concept occurring in a niche, in paper architecture, and which faces dangers of speculation or a continuation of a renewed kind of sprawl, with another appearance and architectural idiom. Across all discussed strategies, a similar kind of obduracy is found. The position of architects who propose thorough change is in conflict with the preference for more cautious strategies preferred by inhabitants, to which planning officials and real estate agents rather respond in a facilitating manner. Architects anticipate paradigm shifts in society and in spatial production as a foundation for their viewpoints.

This chapter furthermore relates of a careful approach to projecting demolition plans which turn around the process of sprawl. Designers do see this as a plausible future development, however unlikely at present. Those who believe that demolition should be taken into account, tend to think in terms of a balance: The opportunities for demolition can only occur if feasible design proposals for qualitative alternatives are offered first. In a similar vein, dwellings might be adapted if a changing neighbourhood induces a demand for alternative dwelling types. The corollary of this stance is that the reconfiguration as well as the removal of a part of the existing stock of detached dwellings need to be considered as complementary elements of a plural strategy. This plurality should diversify architectural production, and include

both urban, suburban and rural projects. Such a strategy needs to encompass large scale and small scale developments on the level of the neighbourhood, but also of housing production in nearby urbanised centres and around traffic nodes, which could prove to become feasible alternatives for living in the periphery or the countryside. The synthesis of this dissertation will further elaborate on the conditions of such a strategy.

While the simultaneous consideration of diverse strategies endorses the viewpoint put forward by the platform DUWOBO, it also demonstrates the risk of the contradictions between the discussed approaches. Han Vandevyvere also points out the importance of integral policy, and discusses the related risk of as *comfort-inertia*, which revolves around the welfare, affordable energy, and living standards which are hard to give up.[77] A lacking consensus endangers the development of an integrated vision, certainly if it is related to the societal lack of a sense of urgency. Sustainable development should not be about choosing the line of least resistance, but an integrated vision could involve the mutual benefits of combining diverse strategies, such as exemplified in the elaborated scenarios.

77. Vandevyvere, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen",72.

6
The design studio and scenario building: A hands-on and site-specific investigation of conditions for adaptive reuse

- Precursor of this chapter: Marijn van de Weijer, and Oswald Devisch, “Towards an Ideal Scenario: Two attempts to integrate arts and science to address spatial issues”, in *Proceedings of the Knowing (by) Designing Conference*, ed. by Johan Verbeke and Burak Pak (Brussels: LUCA, Sint-Lucas School of Architecture Ghent/Brussels, KU Leuven Faculty of Architecture, 2013): 300-311. ISBN: 978-90-81323-86-4.

The argument until here has made clear that, if an existing dwelling is to play out a lasting part in transformative strategies, a very narrow set of parameters needs to be taken into account. This can be read from the arguments of inhabitants and professionals alike. Only few responding inhabitants of detached dwellings in this research have expressed interest in the concept of sharing a typical detached house among multiple households. Those professional respondents who consider home sharing a viable option outline strict conditions. The location needs to be suitable, or needs to be made suitable for example by means of a transformative project with enough critical mass to change the conditions of a neighbourhood. Furthermore, a clear idea is required of what kind of duration and functional fit such housing units need to cater to.

This final investigation aims, before synthesising the results, to enquire into these very specific conditions for sharing a dwelling, and to develop an idea of the kind of parameters and conditions that would render this pathway plausible. This is done in cooperation with young, undergraduate designers, in the context of a design studio about housing transformation. In doing so, this chapter proposes the development of narratives relating of successful pathways of reconfiguration. In line with the focus of this research project, these narratives are developed with the scale level of the dwelling in mind. This focus best suited the skills and interests of the group of designers involved in this exercise, namely Master students of Interior Architecture and Architecture at Hasselt University.

Instead of relying on analysis of realised projects, the research here involves original proposals that were developed by these student designers, who did so on the basis of a matrix of four dwellings and three project briefs. This allowed them to construct the most plausible pathway for an efficient home reconfiguration, and to generate arguments against transformation under certain conditions. By documenting this process of decision making and exploration, they have put forward arguments on the basis of their design work, which are focused on novel ways of reusing existing dwellings. Hence, this chapter partly outsources the design work by involving these students. The design products are perceived as results of a productive process by these students, while the process itself, in conjunction with the argumentation, deliver input for the analysis of this dissertation, next to the arguments of professionals, inhabitants, and of the researcher.

An external view involving design students and mentors

The axial system (**figure 34-35**) proposed in chapter two, organising the realms of science, engineering, professional design and designerly research, frames the involvement of design practice in a research context: throughout this dissertation, design instruments were used in the gathering and analysis of data. This chapter reports of an experiment to involve (interior) architecture students in the contribution of an additional design perspective. It outlines a practical enquiry into the feasibility of dwelling subdivision of prototypical Flemish detached dwellings. The chapter is based on the process and the results of a two-week design workshop during which ten groups of four Master students in interior architecture and architecture were primarily asked to analyse ten detached dwellings in Flanders.[1] Following this analysis, each group worked out a design for one dwelling selected from this sample, proposing a form of shared usage, ranging from a complete subdivision to shared usage by an extended family. The inclusion of a design studio revolving around ten design proposals for existing detached dwelling in Flanders, explores a pathway of *practice based* research which runs via design education.

In the field of design studies, there is a focus on the gathering of knowledge about the development of design skills by students, or the effectiveness of problem-solving instruments, while the content and the results of the design assignment are simplified or even unspecified, in order to create a 'laboratory setting' to test design methodologies.[2] Alternatively, the results and learning progress of students during a design studio are recorded by means of interviews, observation, and documentation of design drawings, with the intention to study the design process, making distinction between design capacity of participants.

1. Workshop Dwelling Transfomations (Oefening Woningtransformaties), PHL University College Diepenbeek, 18 February – 1 March 2013. Participating students: Sarah Adriaensen, Jens Casselmans, Audrey Cipullo, Lynn Croes, Kristoff Cuppens, Marieke de Jong, Ilse De Ketelaere, Elien Driessen, Niels Dujourie, Rebecca Gerrits, Tom Geuns, Paulien Goffinghs, Sarah Hendrickze, Sara Lambrechts, Eleni Lenaerts, Dominiek Lens, Gertjan Madalijns, Célina Maes, Lore Mellemans, Néline Meuwissen, Natalie Pereira, Leen Peters, Lise Peters, Elien Rummens, Shennah Simenon, Paulien Smets, Sarah Stevens, Stéphanie Thys, Nicki Tits, Bo Van den Broeck, Anouk Vandeneede, Anke Van der Auwera, Maud Vandersmisse, Sara Vandeweyer, Marjolein van Dongen, Sofie Vannitsen, Melissa Vanoppen, Thais Van Riet, Jeroen Vercruysse. The workshop was co-organised with prof. Koenraad Van Cleempoel, and in cooperation with designers Phillippe Swartenbroux, Victor Simoni, Jo Klaps, and critics Ruth Stevens and dr. Roel De Ridder.

2. See for example, for a description of a research on the basis of an abstract design puzzle the work of Bryan Lawson, *How Designers Think* (London: Architectural press, 1980).

Without focusing on the content, such studies look how design concepts develop in a process of linking different ideas and information to improve design results.[3] Hence, it is common to conduct research related to design pedagogy by detaching the research scope from the pedagogical and project scope. In this case however, the scope of research and design join in addressing the content at hand, focusing on a investigation of the feasibility of adaptation of Flemish dwellings, and the housing model.

This approach, of involving architectural education, as well as design results emerging from the studio, has received significant attention in a series of recent conferences on the topic of research in architecture and other design disciplines.[4] Especially the *Theory by Design* conference in Antwerp, 2012, specifically revolved around the question whether the design studio could be more than a place of learning the architectural trade, but also the place where new knowledge of architecture is produced, as a result of the interaction between students and researchers. The Bologna process induced a rising interest in the architectural research studio. This interest is preceded by teaching initiatives of avant-garde architects, who have published influential works as a result of their engagement in architectural education. Denise Scott-Brown, Robert Venturi and Steven Izenour in 1972 published *Learning from Las Vegas*, in which results of a studio with Yale students were involved, and which put forward the commercial buildings of Las Vegas, and its urbanism, as a source for architectural design[5]; Oswald Matthias Ungers led the 1977 Berlin Sommer Akademie, organised by Cornell University, which explored an expected population drop in the eighties in West-Berlin, and in answer proposed the concept of a city archipelago, the formation of small urban centres amidst a green environment which would come to existence as a consequence of urban shrinkage and demolition[6]; and more recently, Rem Koolhaas led his Harvard Project on the City, in which diverse topics (How to build a city, Shopping) and regions (the Nigerian capital city Lagos, and the

3. See Gabriela Goldschmidt, and Dan Tatsa, "How good are good ideas? Correlates of design creativity," *Design Studies* 26, no. 6 (2005): 593-611. Also, the work of Candy Carmel-Gilfilen and Margaret Portillo, studying the intellectual development of architecture and interior architecture students throughout their university career can be mentioned: Candy Carmel-Gilfilen, and Margaret Portillo, "Where what's in common mediates disciplinary diversity in design students: A shared pathway of intellectual development," *Design Studies* 33, no. 3 (2012): 237-261.

4. *The Place of Research, the Research of Place*, ARCC (Architectural Research Centers Consortium) and EAAE (European Association for Architectural Education) International Conference, Howard University, Washington DC, USA (June 2010); *Theory by Design, Architectural research made explicit in the design teaching studio*, Faculty of Design Sciences, Artesis University College, Antwerp University, Antwerp, Belgium (October 2012); *Knowing (by) Designing*, LUCA, Sint-Lucas School of Architecture, KU Leuven, Brussels, Belgium (May 2013).

5. Robert Venturi, Denise Scott Brown, and Steven Izenour, *Learning from Las Vegas: the forgotten symbolism of architectural form* (Cambridge: The MIT Press, 1972).

6. Oswald Mathias Ungers, P. Riemann, H. Kollhoff, A. Ovaska, and R. Koolhaas, "Die Stadt in der Stadt. Berlin das Grüne Stadtarchipel," *Lotus International* 19, (1978): 82-97.

Chinese Pearl River Delta) were analysed and mapped.[7] Koolhaas formulated his intention to conduct research in these studios as a prelude to design, establishing a cross-reference to imbue design with meaning and significance in a rapidly globalising world.[8]
Each of these projects takes in a critical stance towards architectural practice, by involving popular culture and 'ugliness', by taking shrinkage instead of growth as a condition for design, or by acknowledging the importance of collecting economical, political and social data in keeping architectural practice relevant – the analytical side of architectural practice is emphasised in order to contribute novel ideas to the discipline.[9] In fact, only the Berlin studio of 1977 included spatial design proposals. The other two studios have intended to study spatial cases by using cross-disciplinary methods. In the case of this chapter, such a critical stance is sought by exploring diverse and particular architectural and users strategies, by means of design practice.

The potential of such a critical stance towards regular architectural practice, policy issues and users preferences, are among the main reasons to take student design work into consideration in this dissertation. In line with the epistemology of practice-based research, as discussed in chapter two, the design studio offers a perspective on the issue of detached dwellings in Flanders, which borrows design instruments and brings these into the research context. The studio has aimed to provide a framework for the participants to work in, involving multiple perspectives on the issue of re-using and transforming existing detached dwellings, most importantly the contradictive stances of designers as reported of in chapter five. Moreover, the format of a studio allows to document thinking processes from the very start, and under conditions which allow to register and compare diverse design trajectories with differing starting points resulting in diverging results.

The involvement of student design work in a research project is not without critique. David Salomon argues that the first interest of

7. See the Harvard Projecton the City chapters in: Francine Fort, Michel Jacques, Rem Koolhaas, Stefano Boeri, Sanford Kwinter, Daniela Fabricius, Nadia Tazi, and Hans-Ulrich Obrist, eds., *Mutations* (Bordeaux, Barcelona: arc en rêve centre d'architecture, ACTAR, 2000).

8. Ken Gewertz, 'GSD's Koolhaas heads 'Project on the City'', *The Harvard University Gazette*, June 6 1996.

9. Also see Kazys Varnelis, "Is there Research in the Studio?," *Journal of Architectural Education* 61, no. 1, September (2007): 11-14; David Salomon, "Experimental cultures: on the "end" of the design thesis and the rise of the research studio," *Journal of Architectural Education* 65, no. 1 (2011): 33-44.

participating students is to be taught about design.[10] Their personal development as a designer should not be brought at risk by the confines of a research project which is not theirs. Furthermore, undergraduate students might not be prepared to produce good quality research. Even simply considering design results, there is a significant difference in design skills between novice designers (such as students), expert designers (experienced professionals) or outstanding designers (influential professionals who assume a lead role in their profession, e.g. avant-garde architects). Ursula Emery McClure warns against the abuse of students executing part of a research, without receiving credit or payment for it, and who are working without clearly defined and fair grading criteria.[11] Another critique can be made based on the scope of this particular research project. As discussed in the introduction, the research approach over the course of the project shifted from a search for potential strategies of dwelling subdivision towards a search for arguments why and how transition strategies could be successful or why not. Throughout the research, arguments against dwelling re-use and subdivision have been put forward. Such a critical attitude is proper to a research project, but in a design studio, if a student would conclude against designing, this situation leads to dissatisfaction with regard to the achieved objectives, and a disappointing result for the participant. The design studio is a failure if it does not accomplish its primary goal, which is the teaching of design skills. A more neutral stance is expected in a scientific endeavour, where a question asked might be answered negatively based on the results of the research. Here lies a conflict between research and design.

The workshop method has been designed to overcome such objections. Primarily, the workshop has been organised in such a way that it not only delivered design projects but also documentation of design decisions and dwelling analysis, in order to collect the decisive arguments of the involved participants. These arguments are treated as data for further analysis in the context

10. Salomon, "Experimental Cultures": 42.

11. Ursula Emery McClure, "The Good, The Bad, and The Ugly: Use and Abuse of the Research Studio," *Journal of Architectural Education* 61, no. 1 (2007): 73-75.

of the research project, comparable to the arguments provided by professional practitioners. Chris Rust speaks of such designerly practice involved in research in terms of "unstated contributions", in the case when an artist or designer produces an artistic or design product, which facilitates enquiry by another party, a researcher.[12] Such an interdisciplinary cooperation allows a designer to produce a design, based on tacit knowledge, and the researcher to use this product as an instrument to gather information, which allows him or her to tackle a complex problem. In this specific case, the designers are acquainted with the societal context of the research, and may sharpen their design capacity in preparation of real project briefs. The researcher benefits of the rich data and contextualisation which are typical of a design project. Both parties operate with the instruments proper to their discipline, and retain authorship over their contribution to the interdisciplinary cooperation. In the case of this workshop, the involved participants are as such regarded to have full authorship of their designs, while these projects, like those of professional practitioners, become a subject of analysis in this dissertation, alongside the arguments which were decisive in the process of analysis and development.[13]

To prevent participants from ending up with a negative conclusion with regard to the potential of redesign of dwellings, the students were offered a matrix to start from (**figure 91**, **above**). This matrix combined four dwellings with 3 project briefs, resulting in twelve possible combinations. Alternatives were limited to 12, in order to balance an in-depth focus on one solution with a broad consideration of multiple possibilities. Design methodologist Nigel Cross suggests that such a limited number of design variations balances the work load of determining potential solutions and elaboration of the one with most potential, which is preferable to focusing too early on one idea or extending the search for multiple possible variants during the design process too long.[14] Each group of four students studied 4 dwellings, and projected three project briefs on these dwellings. The first stages of the workshop

12. Chris Rust, "Unstated contributions: how artistic inquiry can inform inter-disciplinary research," *International Journal of Design* 1, no. 3 (2007): 69-76.

13. An additional goal of the participants is of course also to get good grades. Because of the double goal of this workshop, grading was split up, with 1/3 of the grade determined by a preliminary jury (the author and one critic), evaluating how the explorative process was executed, and 2/3 of the grade determined by a jury of design practitioners and critics, evaluating the quality of the final product.

14. Nigel Cross, "Expertise in design: an overview," *Design Studies* 25, no. 5 (2004): 427-441.

hence consisted of an analysis of the dwellings provided, and an exploration of the opportunities offered by the matrix. In practice, the work was divided between the members of the groups, each student looking in detail at one dwelling, and comparing the results in group discussions (**figure 92** gives an overview of the process). This process was completed by making sketches of solutions for each combination, and assessing the feasibility of the proposed direction through comparison, and building on typical design arguments. The proposal of 12 options, which the students could explore, ensured a prolonged study of different alternatives in a phase of iterations between the problem framing and the search for solutions.[15] The groups were asked to document their design decisions with a logbook. A template (**figure 91, below**) was developed for the pages of this logbook, and included a space to record the time and date of the sketch (in order to trace the chronology of the design process) which dwelling was the topic, and which project brief was projected. This template provided space to paste in an image (such as a sketch, a diagram or a photo) and included a number of questions to obtain insight into the design decisions: What is the underlying concept, or design goal? What are the qualities the groups aims for with this design? Which are the flaws of the proposed complex? And how will the group proceed from this proposal? The logbooks were built up with arguments consisting of both writing and drawing. Most drawings were conceptual and explorative sketches, which served to test ideas and communicate these to the group. Brought together in the logbook, the drawings also stored ideas for later reference, and organised the analytical process leading to the choice for a dwelling and project brief. In line with a categorisation of sketch types proposed by industrial design researcher Remko van der Lugt, the produced images are used as *thinking*, *talking* and *storing* sketches; the storage in the logbook moreover makes individually produced drawings accessible to all group members, they become part of the *group's external memory*.[16]

15. Atman et al. have conducted research on design skills of junior and senior design students; they propose that a consideration of a limited number of alternatives in early design stages, as an advanced design skill which leads to better project results. See: Cynthia Atman, Justin Chimka, Karen Bursic, and Heather Nachtmann, "A comparison of freshman and senior engineering design processes," *Design Studies* 20, no. 2 (1999): 131-152. Also, Donald Schön discusses the reframing of a problem statement during a design process, which occurs when a designer formulates questions which lead to new questions. Donald A. Schön, *The Reflective Practitioner, How Professionals Think in Action* (Aldershot: Ashgate Publishing Limited, 1983).

16. Remko van der Lugt, "How sketching can affect the idea generation process in design group meetings," *Design Studies* 26, no. 2 (2005): 101-122.

This explorative phase has been concluded by each design group by choosing the combination which was considered most challenging and feasible. This selected combination formed the project brief for the phase of project elaboration, which was more close to a traditional design project, adhering to common criteria of design quality which are set by the faculty and the practicing designers who tutor the students.

The direct exchange between students and researchers as such follows an approach derived from participatory action research, which, according to architectural theoretician Henry Sanoff is "not only seen as a process of creating knowledge, but simultaneously as education and development of consciousness, and of mobilisation for action".[17] This field of research shares with architecture a critical analysis of reality, steered by a projective ambition. Students, design tutors and researchers are considered in this context as communities which benefit from such a joint cooperation. This participation should as such primarily challenge norms of knowledge production, and include the perspective of those young professionals who are about to start working with that knowledge.[18]

17. Henry Sanoff, "Editorial, Special Issue on Participatory Design," *Design Studies* 28, no. 3 (2007): 213-215.

18. This may be compared to the participatory research conducted by Caitlin Cahill, studying the experience of young women growing up in the city, and including these women in the research project. See Caitlin Cahill, "Including excluded perspectives in participatory action research," *Design Studies* 28, no. 3 (2007): 325-340.

Theorising the matrix: the scenario approach

The main data for this research thus became the explorative stage, which consisted of the choice for a dwelling and a project brief, based on designerly arguments. The matrix proposed no more than an outline, by only suggesting alternative ways in which people can inhabit a dwelling together. The three options include a full split of the dwelling for two equal, and unrelated households, the second one the creation of an ancillary unit for a care requiring family member (these proposals are both discussed in chapter four, also see **figure 44**). Lastly, the option to design for a reconstituted family was included, to allow the participants to consider sharing of a dwelling by one household with diverse family members, who do not permanently inhabit the dwelling, as children divide their

time between parents. These briefs required further detailing by the participants themselves, and the first phase of the workshop, dwelling analysis (what is the quality of each dwelling?), project definition (how can the dwellings be inhabited alternatively, or more efficiently?) and designerly enquiry (which spatial interventions can be proposed, and lead to an interesting project?) were combined. In short, the participants were asked to develop detailed and plausible *narratives* which serve the elaboration of an overarching *scenario*, relating to the strategy of reconfiguration of dwellings. To clarify this relation, in the following section the matrix approach and scenario devising will be theorised with the help of concepts derived from *futures studies*.

Scenario production is often connected to designerly, practice based research[19], especially in the context of urban design, because of a shared focus on problem cases in which too many conflictive determinants play a role, as is argued for example by Bernardo Secchi.[20] Also in architectural education, the scenarios are seen as a way to connect design teaching to research practice.[21]

The field of futures studies proposes various systems of categorizing the diverse scenario approaches, based on the questions asked, the methods applied, and the contributors involved in developing these scenarios. As already mentioned in the introduction, the overarching scenario approach is considered to be normative according to the categorisation of Börjeson et al., as it serves an enquiry into how a certain goal (broadly defined as a more sustainable use of existing, low density residential neighbourhoods) can be obtained.[22] Other categories are predictive scenarios (answering the question *what will happen?*) and explorative scenarios (*what can happen?*). The proposed categorisation is oriented towards finality, and aims to inform users which scenario method to select in order to fulfil their demand for information. Wilkinson and Eidinow rather focus on the question who contributes to a scenario in their proposal for an alternative set of typologies[23], by taking the involvement of

19. Referring to the interpretation of research through design addressing complex spatial issues with the finality to elaborate a project definition for a given location by means of design practice, as explained in chapter two.

20. Bernardo Secchi, "Diary of a planner: 6. Scenarios", Planum, (2004) <http://www.planum.net/topics/secchi-diary.html> [Accessed March 21 2013].

21. Oswald Devisch, "Research-by-Design and the Renaissance of the Scenario-Method: A design-studio scenario-experiment on the restructuring of ribbon developments in Flanders", in *Planning for Resilient Cities and Regions, AESOP - ACSP Joint Congress* (Dublin, 2013): 1-11.

22. Lena Börjeson, Mattias Höjer, Karl-Henrik Dreborg, Tomas Ekvall, and Göran Finnveden, "Scenario Types and Techniques: Towards a User's Guide," *Futures* 38, no. 7 (2006): 723-739.

23. Angela Wilkinson, and Esther Eidinow, "Evolving practices in environmental scenarios: a new scenario typology," *Environmental Research Letters* 3, no. 4 (2008): 1-11.

stakeholders (which stakeholders participate, and in what way?) as a basis for their definition. They recognize problem-focused scenarios, actor-focused scenarios, and propose a third one, which they term a "Reflexive Interventionist/ Multi- Agent Based" approach. This approach aims to involve the contribution of many stakeholders which all contribute a part of the puzzle in order to tackle wicked problems.[24] Wilkinson and Eidinow emphasise the importance of the process as "an ongoing strategic conversation, establishing and re-establishing common ground amongst an evolving set of stakeholders, as the problem-context continues to evolve".[25]

The design work of students of architecture is rather seen in this context as an *explorative* practice, which provides answers to the question which are possible societal demands, and what is the potential for adaptive re-use of dwellings and which strategic developments would be required to facilitate the exploitation of such potential. It has aimed to pose a question of *what can happen* if dwelling subdivision would be implemented more easily and more often, by illustrating how designers would tackle this design brief. Hence, this workshop facilitates an action-based involvement of specialists (and future stakeholders; since young designers in Belgium tend to establish their practice usually with small renovation and transformation projects for private clients[26]), in accordance with the *Reflexive Interventionist/ Multi- Agent Based* typology of Wilkinson and Eidinow.

The involvement of designers brings attention to another basic feature of a scenario, which is the hybrid mix of ratio and imagination during the process of scenario building. Scenario developers rely on both of these aspects; to trace interdependencies, to map patterns, to extrapolate trends, or to reduce parameters. System thinker Philippe Vandenbroeck proposes the *hourglass* as a symbolic image for scenario processes, and it illustrates how ratio and imagination come together in the process of scenario

24. Horst Rittel, and Melvin Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4, (1973): 155-169.

25. Wilkinson and Eidinow, "Evolving Practices in Environmental Scenarios": 9.

26. Stefan Devoldere, "Een Aangepast Woonkader," in *Radicale Gemeenplaatsen. Europese Architectuur Uit Vlaanderen. Architectuurboek Vlaanderen N°10*, ed. by Ilse Degerickx, Aglaée Degros, Maarten Delbeke, Stefan Devoldere, Christoph Grafe, Elke Hoornaert, Christian Kieckens, André Loeckx, Dirk Somers, Axel Sowa and Ellis Woodman (Antwerp: VAi, 2012): 162-175.

building.[27] Scenario-builders face an uncertain future which is a consequence of a multitude of complex forces which are at play in the present. This is the broad top of the hourglass. This situation is termed *unstructured complexity* by Vandenbroeck. When starting the development of scenarios, an analysis in search of interdependencies, hierarchies, patterns, and so on, is set in motion; this analysis halts at the point where this complexity can be reduced to a limited set of key uncertainties, which are considered to be most influential, and in this simplified state, multiple scenarios envisioning their future development may be proposed (a 'structured simplicity'). This is the passage of grains of sand from an upper container via a narrow passage to a lower container. Finally, these scenarios are made more complex again by developing structured narratives (structured complexity).[28] In this case, this includes regular details of an architectural design project, such as the formulation of a concept, the translation of this concept in a spatial organisation, and the choices with respect to material and construction methods a designer typically needs to make.

Scenarios are therefore often developed as processes with distinct steps, each of which either with a rational or imaginative emphasis.[29] Vandenbroeck et al. argue that rationalisation leads to the selection of two key uncertainties, each with two possible extremes.[30] These uncertainties and extremes determine an axial system in which four scenarios, determined by the four quadrants of such an axial system, may be explored. In the context of this research, the development of normative scenarios involving on specific design strategies led to a different exchange between rational and imaginative aspects. Because the definition of possible scenarios rather emerged from a study of contemporary concepts and strategies (as discussed in previous chapters), key uncertainties emerged from study of the housing stock and the viewpoint of stakeholders on the detached dwelling in general, and are closely related to concrete designs strategies. The matrix hence

27. Philippe Vandenbroeck, "The Added-Value of Scenarios for Strategic Spatial Planning" (Master Thesis, KU Leuven 2011).

28. Philippe Vandenbroeck, Annette Kuhk, Els Lievois, Jan Schreurs, and Frank Moulaert, "De toegevoegde waarde van scenario's voor het ruimtelijk beleid. Finaal deelrapport", (Heverlee: Steunpunt Ruimte en Wonen, 2011): 40-42.

29. See, for an overview of such systems of steps, van de Weijer and Devisch, "Towards an Ideal Scenario", as well as Devisch, "Research-by-Design and the Renaissance of the Scenario-Method".

30. Vandenbroeck et al., "De toegevoegde waarde van wcenario's voor het ruimtelijk beleid": 40-41.

served to structure the simplicity, by juxtaposing housing quality (concrete examples of reoccurring detached housing types) and possible forms of alternative inhabitation (three project briefs) as two key uncertainties which determine the future role of strategies addressing detached dwellings in the housing stock (as elaborated in **figure 89**). The difference with the description of Vandenbroeck et al, lies in the further elaboration of the structured simplicity by exploration of the matrix by participants. This approach matches the interest and the experience of the workshop participants, which are design-based. Design thinking was therefore at the basis of a rational stage and an imaginative stage. The rational stage primarily constituted the analysis of the four dwellings from which the design team could choose. This was followed by a study of the dwellings and project briefs at hand with help of the provided matrix.

The students were made aware of external factors, conflictive viewpoints and professional attitudes, which define the complexity of the research question behind the design workshop: this happened by means of lectures[31], and as a result of the involvement of design tutors with practical design experience, who took in contradictory attitudes towards the problem of re-using detached dwellings. Design arguments became the basic elements of narratives. The arguments explain the conditions for a successful implementation, in terms of the dwelling types which are feasible for adaptation and the way households could live together in such dwellings. In the follow-up imaginative stage, the design path was elaborated into a complete design, together with a detailed explanation of the *modus vivendi*, which elaborate the resulting scenario with added parameters, which allow for an evaluation of the initial ideas resulting from using the matrix. The heuristic of the matrix stimulated the designers to formulate the exact conditions of plausible and attainable narratives. As such, a combined argumentation can be synthesized combining knowledge of how to re-use existing dwellings and knowledge of which parameters

31. These lectures included an introductory lecture on the research project (Marijn van de Weijer), a lecture of a practicing architect (Saidja Heynickx), of an architectural historian (Francis Strauven), of a representative of 'Samenhuizen vzw', which is an association representing the interests of cohousing groups (Roland Kums), of a researcher specialised in building physics (Griet Verbeeck), and of a government official in the domain of housing policy (Ingrid Quintens, province of Limburg).

inhibit or support such a re-use, as the matrices equally delivered arguments against reconfiguration of certain dwellings under the given project briefs.

Development of design projects

Ten dwellings were proposed as study objects for this workshop, three of which came from the sample of 65 dwellings, documented during fieldwork by the author.[32] Seven additional home owners were found willing to contribute[33], and invited the participants to study and document their dwelling. **Figures 93 and 94** give an overview of the spatial organisation of these buildings.[34] Each design group formulated the conditions to develop a feasible narrative starting from the twelve options at hand. This selection process was informed by positive arguments to choose for a combination of a certain project brief and a specific dwelling, and by negative arguments leading to the exclusion of such combinations. The groups needed to find a rationale to base their project upon, and this process of working from 12 options towards one which is considered most feasible, allows for the recognition of similar processes of problem definition and abstraction.

As a result of this thought process, three dwellings were not considered by any of the groups for drawing up detailed plans. Those groups dealing with two of these dwellings, were clear and unanimous about their arguments: dwelling E (built in 1982), was considered inappropriate for a conceptual change. Based on its complex *raumplan* layout, clearly articulated volumes and a defined architectural style, designers perceived practical problems of accessibility and thought it unbeneficial to transform the organisation which is defined by a very pronounced architectural concept. Dwelling G, a compact dwelling built in 1981, and one of the smallest in this sample, was considered not suitable because sharing this dwelling would require far-reaching interventions, which were not considered feasible. Dwelling K, a spacious fermette dwelling type with a large double garage built in 1979,was

32. These are dwellings H_14, H_62, and H_65.

33. These owners were found again by delivering invitational letters ‘by hand’ in selected neighbourhoods of two of the case study municipalities. If the inhabitants were at home, the letter was handed personally, and additional explanation about the scope and method of this design exercise was provided. All participating owners were found in this group of personally addressed inhabitants.

34. The dwellings were coded with letters in the studio, which will be maintained here for the sake of anonymity.

not selected because of the ascendancy of favourable qualities of other dwellings in the sample, rather than because of its own defaults. One common critique formulated was the poor natural lighting conditions, which was however seen as a challenge to be addressed for other groups, who were studying comparable dwellings (such as the much smaller fermette, dwelling C, which was selected by two groups).

The groups constructed positive argumentation around the seven elected dwellings, and six groups preferred a *strict separation* as a project brief. An *ancillary unit* was designed by three groups, and only one group chose to design for a *reconstituted family*. As a result of these choices and the design-based search of the participants, four narratives emerge from the matrix. These narratives became the ground on which design decisions could be based, by means of typical architectural images and arguments.

First focus: a new interpretation of traditional dwellings

The first focus was based on the concept of redefining and revaluing traditional housing units in the light of contemporary conditions, and were applied to dwellings B (a dwelling built perpendicular to the street in 1978, on an elongated lot) and C (a typical fermette style dwelling from 1978, parallel to the street). These dwellings were selected because they represent very common typologies, which have aged over time, and are in need of revision according to the participating groups.

Especially for the fermette dwelling, the designers aimed to formulate a generally applicable statement with regard to this reoccurring dwelling type. The notion of flexibility was prioritised by both groups; the sharing of a dwelling by two households or a reconstituted family was considered by the designers as a temporary condition, which required a projection into the future and the consideration how the dwelling could be used if family conditions continue to change (**figure 95**). The main question for

the designers became how to balance privacy and collectivity, by means of determining which spaces would become private, and which spaces would be shared between members of the double household, and how the circulation system should organise these spaces. The performance of aged dwellings in the light of contemporary conditions became a challenge for these designers.

The elaborated strategies included envisioning how architectural interventions facilitate that the dwelling remains useable after family conditions change. The designers therefore searched for a design strategy which allows for adaptation with minimal interventions at a later stage, to deal with changing household conditions. As a consequence, specific design decisions were prioritized, and were implemented for an envisioned first stage of usage, while other improvements were considered, to be more relevant for later stages. The two groups which worked in this way, proposed major interventions which were argued to be essential for facilitating this longevity. In functional terms, both groups made distinction between quarters for privacy and retreat, spaces for shared usage and family life, and shared servant spaces, such as circulation and storage spaces. The design of large spaces for private retreat (more than just a bedroom, and including sanitation and additional living spaces), and the implementation of multiple family rooms, allow the inhabitants to join each other in daily activities, but also facilitates the option to organise separate activities at the same time. One group proved how in the future, a more strict separation between units could be made, while the other group argued that the tight relation between a traditional family unit and an ancillary unit could be forged in to one, larger unit in time. Both groups argued that interventions in the facade would be feasible in the context of this narrative: Dwelling B was completely insulated (**figure 96**) and dwelling C was expanded with large dormers, increasing the useable surface upstairs and improving lighting conditions of this traditional *fermette* type dwelling.

Second focus: A unit attached to the existing dwelling
The second focus leaves existing houses intact as family dwellings, but seeks to inscribe a second housing unit by redefining secondary spaces, such as the garage. This narrative seeks to project a minimal intervention in the selected dwelling, and is based on an analysis distinguishing which spaces are essential for the quality of the existing dwelling, and which spaces are not. The garage comes forth from the analyses, especially if additional storage space may be found in the basement or the attic. This results in the selection of an ancillary unit as a project brief. Further parameters taken into consideration are the usefulness of such a transformation in the future, imagining that diverse kinds of inhabitants, both young and old, might come to inhabit the added unit. Also, accessibility became a primary target. The group who chose to focus their design trajectory in this manner, designed for dwelling A (a large villa built in 1980 on a corner lot, with two whole floors under a pyramid-shaped roof), aiming to maintain the typical qualities of dwelling: this focus relies strongly on the landscape of its garden, the proportion and organisation of its spaces, and the ample storage room, both on ground level and in the garage, which allows for the addition.

The original dwelling remained largely intact (**figure 97**). The strategic approach which was elaborated for this focus, entailed that the facade for the new residential unit would be completely insulated, while the facade of the original dwelling would remain untouched, because this dwelling is not transformed. The new unit as a result should be in line with contemporary regulations for energy efficiency, and is recognizable in the streetscape because of the contrast it makes with the original dwelling. The care for a complete accessibility, considering a wheelchair user as a potential inhabitant, became a second important element in this narrative. This had its impact on the organisation of interior spaces, and on the sloping entrance pathway to the ancillary unit. Furthermore, the relation to the existing dwelling and the backyard

became important aspects, as the designers organised interesting views from the inside onto the garden, and connected the units by means of a central terrace, which is accessed from the main living spaces of both dwellings. this narrative results in a definitive transformation, which makes the building more specific; the close relation between the two residential units, require a specific household condition.

Third focus: reassigning spaces in large houses

The third focus seeks to make better use of relatively big housing units, specifically the three dwellings D, F, and H. Dwelling D (built in 1965) is a cubical volume on a corner lot, consisting of 3 stacked floors (basement, ground floor and first floor). Dwelling F (built in 1974) is a rectangular volume with a pitched roof, perpendicular to the street, organised in a ground floor, first floor and attic floor. Dwelling H (built in 1969) is a bungalow type organised around a large central space, which in a later phase was extended with a partial first floor. Four groups narrowed down their feasible opportunities to the concept of projecting two distinct housing units for these dwellings. The size and organisation of these houses were the prime reason for selection because, in the viewpoint of these designers, the houses offer a sufficient degree of freedom to project diverse briefs and also diverse modes of subdivision. The students therefore argued that their design narrative should revolve around determining which would be the optimal design approach to profit from the qualities of these dwellings. For dwelling D and F, the flexibility was seen in the sensible volumetric and structural organisation of spaces, while dwelling H was considered a more complex unit. The structure challenged the designers to develop a meaningful transformation with respect for its architectural values, and taking its structural and functional deficits as focal points. This argumentation entailed that the design brief was defined with the requirement to resolve the programme within the existing structure, and resulted in questioning how inefficient parts of a building could be dealt

with, supporting the inhabitation by two households instead of one. Such spaces are a north-oriented sun lounge for dwelling D, an attic without sufficient height and lighting for dwelling F, and the dark, covered central space of about 100 m² for dwelling H. The groups searched for arguments to choose between partial demolition of spaces considered obsolete or malfunctioning, or redesigning these to cater to different functional requirements.

The narratives developed from this shared focus of four groups differ significantly. Dwelling D and F are both compactly organised volumes with a first floor unhindered by a roof construction. For the former dwelling, a narrative of complexity was developed, while for the latter one, the group opted for a narrative of simplicity. Dwelling D was redesigned to have two housing units which, in a complex manner, intertwine (**figure 98**). This was proposed in order to provide each unit with good lighting conditions, interesting views and a practical connection to the garden and to the basement storage spaces. The concept is strongly based on the existing structural system of parallel bays, which remained intact. A central double staircase was the main intervention of this proposal. It leads to two housing units which are each more than an apartment and more than a semi-detached dwelling (**figure 99-100**). The organisation of the lot allowed for a double access system on two sides. For dwelling F, a more sensible division in an upstairs and a downstairs apartment was proposed, made accessible by the existing staircase. The narrative was built on a search for the simplest way to unlock the potential of the large size of this dwelling. The group brought in the argument that this would also offer most flexibility for inhabitants, as the lower floor apartment could remain accessible for wheelchair users. The linear lot required the addition of a terrace and an external staircase to make the garden accessible.

Two groups working on the only bungalow type, built their narrative on the search for good lighting conditions and a balance between collectivity as well as privacy for both projected residential units. The intricacy of this building was perceived as a challenge to make more efficient use of the built space, and to do so under contemporary conditions for inhabitation. Both groups opted for the demolition of a part of the roof, transforming the central space into a central open courtyard. These narratives relate of the conflicts resulting from this decision: more light meant also less compactness, more building waste, and direct views between the two dwelling units across the courtyard. Both groups finally opted for a rigorous transformation, including also a treatment of the roof and the facade, optimising the energetic performance as far as possible (**figure 101-102**). This focus/ narrative combination puts forward inhabitation of a neighbourhood at higher densities, without increasing the footprint of buildings, still providing direct connection to this green environment or the garden; such projects might be alternatives to the generic layout of apartment buildings in villages.

Fourth focus: superimposing new concepts and new spaces

The fourth focus strives to divide dwellings into two separate units, by adding a volume to the building (**figure 103**). Such an expansion was proposed to create opportunities for a horizontal subdivision of dwelling B (changing the roof structure with a dormer, expanding the useable space of the upper floor so that it would be almost equal in surface to the ground floor) and to organise the circulation space for a vertical subdivision of dwelling J, which is a rectangular volume with a pitched roof, parallel to the street (by adding a volume to the side of the dwelling). The two groups who worked in this manner proposed to redesign the traditional family house for two young starter households, and, in contrast to the narratives building on flexibility and durability, envisioned that this inhabitation would be rather temporary, until another type of dwelling would be required. These approaches

Table 6.1:overview of strategies and narratives.

Focus	project brief	dwelling	narrative elements	design strategies
1. a new interpretation of traditional dwellings	reconstituted family, ancillary unit	B (1), C (2)	flexibility Privacy / collectivity Energy and daylight Replicable concept	I: Flexibility: simple interventions in a later stage/ Start phase more collective, follow-up phase more private quarters/ Improvement of the building shell (roof).
				II: Flexibility: re-appropriation of secondary unit after household change/ Collectively used living spaces/ Improvement of the building shell (roof and façade).
2. a unit attached to the existing dwelling	ancillary unit	A (1)	Withhold original family house Re-use of secondary spaces to add permanent unit	I: Emphasise separation in architectural articulation/ Design attention focused on ancillary unit/ original unit remains functionally equal/ Design for accessibility/ High-quality interventions ensure usability.
3. reassigning spaces in large houses	complete subdivision	D (1), F (1), H (2)	Determine best opportunity Reinterpret spaces (Partial) demolition	I: Introduce alternative dwelling types in a suburban environment/ Complex dwelling units/ Improved lighting and orientation.
				II: Sensible transformation/ Shared secondary spaces/ Concept based on most obvious separation.
4. superimposing new spaces and new concepts	complete subdivision	B (1), H (1)	(weak focus, diverging arguments)	-

were based on the development of a preferable concept which was projected on the selection of four dwellings, rather than an analysis of qualities and opportunities of the buildings themselves. The design groups encountered problems for the implementation in the follow-up stage, as a result of detailed design explorations. The architectural concepts proposed therefore were rigorously adapted during the process. These shifts, and a limited grounding on analysis of the buildings at hand in this early stage, led to a weak narrative, which will not be addressed further, although the groups managed to develop feasible design concepts during the follow-up phase.

Scenario building based on the gaze of the designer

The disentanglement of research and design – the design being framed by the research topic in a co-productive workshop environment – allows for the construction of scenario elements which provide a rich pallet of conditions for the feasibility of an overarching, normative scenario. Design arguments and narratives explain the underexposed conditions under which subdivision or sharing of dwellings might occur. Table 6.1 gives an overview of the developed arguments, in terms of the project brief, the inhabitation pattern, and the architectural project responding to these conditions. From this table emerge three developed narratives which illustrate possible ways to realise a scenario involving reconfiguration as a strategy. In looking for a structured simplicity to build a design on, some parameters were bracketed, and taken out the equation to be able develop innovative design arguments. For certain groups (focusing on strict and long-term subdivisions), the legal framework became this bracketed parameter, which enabled a free search for alternative residential typologies. In other projects (looking to attain a significant result with minimal means, and projecting ongoing improvements in the future), energetic performance was bracketed in the initial phase, which allowed for a search for typological transformations in order to provide arguments for improving an aged dwelling at later stages, as such

proposing a step-by-step plan for home improvements. One group (proposing the accessible unit next to an untouched home) placed the functioning of a dwelling in between brackets, safeguarding the functioning of a good-quality dwelling: all underutilised spaces which are left over, became the material for a design elaboration. In the first focus, the designers drew up proposals which allow for a continuous flexibility. This flexibility defines a new longevity for typical dwellings, and provides arguments to combine such a transformation with improvements in the energetic performance. Furthermore, designers made a case for collectivity and shared usage of spaces, and proposed spaces which mediate this sharing with the needs for privacy. In the second focus, a permanent unit is designed, looking for the qualities necessary to provide a durable unit, which is suitable for inhabitants with diverse capacities and conditions (young/old, related/unrelated to other household, with/ without disability). In the third focus, a rigorous subdivision of excessively large dwellings requires the rethinking and reorganisation of the entire building, which leads to equal housing units, reinterpretations of suburban living. The strongest proposals look for alternative typologies.

The subdivision of dwellings, as is discussed in previous chapters, is met with distrust in most rural municipalities, by officials and inhabitants alike; it is furthermore a topic of discussion among planners and architects. These projects demonstrate detailed conditions under which such rather unfamiliar concepts could be implemented. In doing so, they illustrate the overarching scenario for reconfiguration of dwellings with design arguments, defined by an architectural scale level. The proposals demonstrate how a modest impact of such transformations on the urban tissue – the designs are mostly envisioned within the building shell of existing buildings – simultaneously results in significant differentiations of the housing stock, and potentially provide a new vision for suburban and semi-rural living. These projects also demonstrate the limits imposed by contemporary legal frameworks facilitating

dwelling subdivision and sharing. Furthermore, they explore the given of incremental adaptation to dwellings, which is common to spread costs and, in comparison to demolition followed by replacement, enjoys tax benefits. While in practice, this often leads to suboptimal solutions[35], the workshop has explored concepts aiming to see this transformative process as a benefit to be able to adapt the house to changing household conditions, as such looking for surplus values of a phased design process.

35. As recorded in the interviews with professional designers (see chapter five), and also as was expressed by the design tutors over the course of the studio.

36. Lawson, *How Designers Think*, 30-32.

Limits of practice-based enquiry in the design studio

The hourglass model provides a framework to generate knowledge based on the thought processes and the output of designers, which by means of a matrix, is proposed as an operative structured simplicity. From this structured simplicity, an understanding of conditions, both favourable as well as negative ones, for potential solution paths emerges, which explain the preconditions of scenarios which involve reconfiguration strategies. This approach furthermore draws forth understanding about what might be the built result of designing with these narratives in mind, and demonstrate which design strategies result under the defined conditions. The controversy inherent to research *through* design is tackled by assigning design tasks to interested stakeholders, by means of involving students in an interaction which is intended to be mutually beneficial. The structure at the basis of their design production aims to collect design images and arguments as data for further analysis in the context of the overarching research. To what extent can this experiment be termed a successful amalgam between research and design practice? To address this question, some critical remarks need to be taken into account.

In his book *How Designers Think*, Bryan Lawson[36] describes an experiment which was conducted with advanced students of science and of (architectural) design, in which the participants were asked to solve a spatial puzzle. This puzzle consisted of a rectangular plan and coloured, modular blocks. The blocks

needed to be placed on the plan according to some ground rules, and the resulting perimeter needed to show as much of one colour as possible: according to Lawson, over six thousand solutions should be possible taking the ground rules into account. The most striking difference in approach between the scientists and the designers, Lawson concluded, was that the scientist worked "problem-focused", towards an understanding of the puzzle, and tried to understand its rules, while the architecture students worked "solution-focused", simply trying to achieve a satisfying result with a trial-and-error method, without worrying about the system behind the puzzle. The participants of the workshop on dwelling transformation also had this focus on the solution, which made it difficult for them to explore the matrix without bias. Some of the designers quickly followed their instinct to develop an idea about the brief they wanted to formulate, and felt that the systematic exploration of different dwelling types and modes of inhabitation was not necessary to come to a satisfactory result. Such hunches are typical for design practice, and can never be completely rationalised.[37] Although in the discussed design studio, rationality was sought for in the organisation of the workshop, and the participants were stimulated to document their thought process, it is doubtful whether all tacit arguments and personal preferences become explicit during this structured process. The fact that designers make very diverse analyses of the dwellings at hand demonstrates emerging differences in opinion on the feasibility of dwelling subdivision. These controversies raised awareness among the participants of the difference in possible pathways for dealing with the housing question, each with its proper strengths and weaknesses. A summation of negative characteristics (such as poor lighting conditions, or inefficient organisation) therefore became reason for one group to accept this as a challenge, and for another group to opt for another dwelling.

As is the case throughout the entire research project, the disciplinary conditions of architecture ensure that the analysis

37. In the words of Nigel Cross, these hunches are the "creative leaps" which propel a design project. Nigel Cross, "Creative Cognition in Design I: The Creative Leap," in *Designerly Ways of Knowing*, ed. by Nigel Cross (London: Springer-Verlag, 2006): 43-61.

of a stated problem and potential design-based solutions are inextricably bound up with each other. This sets this architectural, design-based research apart from design-based research as is done by design methodologists, who are more able to untwine research scope (creativity or design methods) from the design topic at hand. The involvement of practitioners as design tutors also in this case has influenced the choices that design groups have made, and the design concepts which were finally elaborated. This is typical of architectural education. Over the course of the project, differing viewpoints among professional designers led to strong clashes of opinion on the feasibility of some design proposals, which illustrates the ongoing debate on sustainable housing and how this is coloured by diverse positions, as discussed in chapter five. It has been the aim of this workshop to get students acquainted with such differing professional viewpoints on the subject of housing renovation and adaptation, and as such the involvement of practitioners is beneficial and essential.

Furthermore, the framing of the problem as was done for this workshop, is inscribed in one of the overarching strategies, focusing on reconfiguration of existing dwellings. For more completeness in the context of the research project, equal exercises related to the other two strategies, replacing or removing part of buildings and neighbourhoods, are required. As such, also other expertise, in the field of landscape architecture or urbanism, could be involved. Other, equal design studios addressing the Flemish housing stock and the condition of sprawl are organised in the architecture schools of Flanders[38], each with a proper scope and working method, which only allows for a partial comparison.

For this reason, and following the argumentation of Wilkinson and Eidinow, who propose scenario developing as a "reflexive task" and "an ongoing strategic conversation"[39], the suggestion is to approach the scenario method as part of a longer process. This process, facing the constant challenge of spatial issues by

38. Within Hasselt University, Oswald Devisch organises a yearly seminar on urbanism, which in recent years has addressed allotments and ribbon developments in Limburg. The Sint Lucas School of Architecture, campus Brussels, upholds the tradition of organising the design studio 'Empowering Suburbia' every year (tutored by Kris Scheerlinck and Bruno Peeters). At KU Leuven, the author co-supervised Master level theses on the topic, which involved design as a component: Eline Daniels, "Sleutelen aan het landelijke woonideaal in Vlaanderen" (unpublished Master thesis, KU Leuven, 2013); Anne-Sofie Verheyen, "Kavel per Kavel, Onderzoek naar duurzame alternatieven voor de klassieke verkaveling in Vlaanderen" (unpublished Master thesis, KU Leuven, 2012).

39. Wilkinson and Eidinow, "Evolving Practices in Environmental Scenarios": 9.

means of designing, and encountering diverse controversial viewpoints, offers experiential knowledge to designers, which is more valuable than the design results themselves. In such a context, the student would have the opportunity to develop the skills to take diverse professional viewpoints into account, and make a balanced decision, in the awareness that design problems may be solved in different manners, with differing strategies, and that the viewpoints of involved stakeholders (such as design tutors) each have their own validity as well as drawbacks.[40] For an involved researcher, comparison of multiple scenario-based design efforts also should offer a better insight into the problem at stake, and allow to detect biases which occur as a result of the typical functioning of an architectural studio. The process of designing with awareness of these viewpoints brings out opposing arguments and makes all participants aware of the temporal and contextual condition of spatial problems in reality. This could redefine the relationship in the studio between involved students and researchers in the field of architecture, in order to develop more co-productive approaches which yield significant result for both parties, and possibly including also other stakeholders in the studied topic.

40. Carmel-Gilfilen and Portillo describe the development of students, who, in the first years of the curriculum, tend to follow the authority of their tutors, and structure their design process in a linear way, while in later stages, more responsibility is developed to produce a good design work, according to properly defined criteria, and by means of an iterative design process. "Where what's in common mediates disciplinary diversity in design students": 239.

Conclusion

This chapter has elaborated detailed narratives which illustrate the feasibility of dwelling reconfiguration with architectural and design-based arguments. The divergence of the three distilled narratives underlines the conflictive viewpoints on the feasibility of reconfiguration of detached dwellings, within society in general and within the discipline of architecture specifically. These narratives mediated between a minimal approach, which aims to find possibilities of shared usage at low costs, and a more inclusive approach, which envisions to provide a long-term future for existing dwellings. Very flexible dwellings, as discussed in chapter four, proved to offer various options for subdivision. Less flexible dwellings were however also of interest to the designers who built

up their narratives around arguments in favour of improving the stock of aged and demoded detached dwellings. These designers implemented concepts of flexibility based on detailed accounts of how a dwelling can be inhabited through time, and introduce shared usage of space among sharing households. In both cases, the development of these narratives, and the projection of functional concepts, determined in what way technical and aesthetical concepts were involved: this underlines how the feasibility of retrofitting a dwelling is determined by technical aspects such as functional capacity and energetic performance, but also by projected forms of usage. Designers therefore play a key role in (de)constructing the flexibility of dwellings through their professional practice of designing for and advising clients. The developed arguments and designs hence contribute to the layered data which determines the feasibility of the main strategies of reconfiguration, replacement and removal, and the scenarios which involve these strategies.

7
Synthesis

The research project Large, Underused Dwellings in Flanders has set out to examine the future of the detached dwelling in the light of demographical changes. In this dissertation, emphasis has been placed on an enquiry into spatial planning and architecture dealing with inert houses and neighbourhoods, taking the critique on sprawl and on the detached house as a starting point and involving design proposals to gain insight into the matter at hand. In doing so, this dissertation has aimed to explore whether the intersection of distinct spatial issues, such as the current mismatch between housing demand and housing supply, the expected need for additional housing units in the future, and economical as well as ecological critiques of the typically dispersed Flemish settlement pattern, opens up a window of opportunity to address these issues simultaneously. As a consequence, this work mediates between two perspectives. Firstly, it subscribes to the viewpoint which is ever more being cultivated in architectural and governmental circles, such as, for example, the think tank Architecture Workroom Brussels, or the Flemish state architect, which acknowledges the need to reorganise the housing model in Flanders. In a similar vein, the research has taken on a transition-oriented outlook. Secondly, it brings together theory and fieldwork with the goal to provide an analytic perspective on the issue. Theoretical explorations have provided specific angles for framing the diverse results of fieldwork and experiments. In chapter one, the introduction, the first research question was formulated as follows: Which specific architectural strategies, addressing the detached dwelling, are available for operating in low density residential neighbourhoods, how can these be implemented in the specific Flemish context, and which are the underlying paradigms? The second question which was proposed in the introduction, goes deeper into this connection: What are the most fundamental aspirations of involved stakeholders (specifically inhabitants, spatial planners and designers) in consideration of maintaining or readjusting the housing model consisting of large, detached dwellings in a low density environment, and which alliances and paradoxes exist between these interests? On an epistemological level, chapter two enquired into an explanation of the concept of practice-based research, and responded to the third question enquiring into the concept of research through design. The broadness of the concept was defined as a problem in the light of the ambition to develop design as a central and intrinsic contribution to a proper research methodology in the field of architecture. Two approaches, which exemplify differing claims of performing research through design, were discussed and positioned with help of a continuum divided by two axes, the vertical one distinguishing between mimesis and rationality, and the horizontal one distinguishing between problem defining and problem solving. This analysis frames the contribution of design throughout the dissertation, and the two primary questions were addressed from chapter three onward. Chapter three outlined two diametrically opposed concepts, the compact city and the dispersed city, as two fundamental paradigms, each with a distinguished outlook on the detached dwelling in a low-

density neighbourhood. These concepts informed the formulation of strategies, which envision reconfiguration and replacement (when applied to the neighbourhoods discussed in this thesis, these were related to the dispersed city paradigm) and removal (adhering to the compact city paradigm). Conditions and parameters tied to these strategies were deduced from the discussions with inhabitants. Chapter four has revolved around the dwellings of interviewed respondents, which served as a sample for typological analysis. Characteristics of dwellings were interrelated in three organisational abstractions, in order to develop a concept of flexibility proper to these detached houses. This reconceptualised flexibility depends on a good organisation of served, servant, and circulation spaces, which is only the case for a limited amount of dwellings. Moreover, these organisational qualities do not coincide per definition with physical, or aesthetical quality. This approach looked for indicators which would facilitate an alternative appropriation of commonly occurring buildings with limited interventions and in line with contemporary housing and spatial planning codes. With these two results documented after one another, chapter five reported of the discussion with professional stakeholders which has been directed at unveiling how such arguments are weighed in professional practice. This analysis has led to a more complex elaboration of the relation between visions, strategies and narratives throughout time. Chapter six has provided a more specific lens in addition to this typological investigation. Involved design students have both considered re-use of rather flexible as well as rather inflexible dwellings. These inflexible dwellings pose a challenge urging the designer to develop a feasible approach in dealing with dwellings which do not uphold contemporary housing standards, in terms of energetic performance, style and organisation.

Throughout these consecutive chapters, arguments emerge as a result of an iteration between practice-based and theoretical exploration, and clarify the feasibility of diverse transition pathways. The juxtaposition of these chapters also demonstrates how the respective conclusions point out converging and diverging directions or even contradictions. The final chapter of this dissertation attempts to synthesise the gathered knowledge and to elucidate the functioning of the discussed strategies. It does so by making explicit and addressing a number of theoretical and conceptual frictions which have emerged throughout this dissertation. This leads to a final amendment of the strategies involving reconfiguration replacement and removal, which form a red thread throughout this research. The interaction between theory and design practice is continued by means of a projection of the amended strategies on three out of the ten case study municipalities. In this projection, a site-specific orientation frames the feasibility of these transformative approaches in a concrete, spatial reality. Based on this final amendment and these conclusive projections, it is argued that the outlined strategies should be viewed as mutually interdependent, as diverse locations and timeframes require diverse approaches.

Societal, technological and design-based arguments

The architectural perspective presented in this dissertation has aimed to shed a specific, disciplinary light on the elaboration of theory regarding transformative concepts applied to the residential environment. The intermezzo preceding this synthesis summarises the argument made so far, and outlines the correlation between societal, disciplinary and technological arguments. Selecting a fitting strategy for dealing with the detached dwelling in a low-density residential environment depends on complex conditions: the opinions of diverse stakeholders, the organisational patterns laid down in neighbourhoods and buildings, and local conditions strongly determine which approach would be fitting. The transformation of dwellings, in order to cater to contemporary housing demand, emerges as a disputed topic, a concept which is seen by one group of people (inhabitants and professionals alike) as a good solution for the changing housing demand, while another group of people contest its usefulness and quality. The projective search for possibilities of subdivision, equally mapped a number of difficulties and opportunities, taking form as typological analyses of organisational patterns which determine how a dwelling could be used, and as narratives which illustrate how multiple households could occupy such structures. These studies have pointed out how a design professional might facilitate these alternative patterns of inhabitation in detached dwellings, but these results do not underline the possibility of widespread re-appropriation of houses by multiple households, because the hypothetical oversize cannot be capitalized without a significant effort. The viewpoints discussed throughout this work demonstrate a number of conditions determining the (continued) role of existing detached dwellings in a process of transition of one housing model to another one. Some of the explanations given in the separate chapters point out conflictive results. Primarily, this synthesis addresses some ambiguities which emerge from a comparison of the complementary methodologies represented throughout the preceding chapters.

One ambiguity may be read in the comparison between architectural analysis and stakeholder involvement by means of interviews. The process underlying this dissertation consisted in several steps of drawing forward transformative concepts, testing these in an interaction with relevant actors, and formulating either conceptual revisions or complementary analyses. Such complementary analyses led to the juxtaposition of arguments derived from conversations with people (demonstrating what pathway they perceive to be feasible or desirable, and documenting the reasons behind their opinions) and the arguments derived from design projections and the analysis of the built environment (aiming to give insight into the feasibility of the built environment to be adaptively reused, and developed in response to emerging critique as a result of the interaction with diverse actors). In this juxtaposition, a clash might be perceived between a descriptive, (social) constructivist registration of actor positions on the one hand, and a technocratic projection of theoretical modes of inhabitation on the other hand. This is actually very typical of the profession of an architect, who has the assignment to envision and to materialise a space for a certain usage, and need to do this with empathy and understanding for delicate societal issues. An overarching belief (for example in sustainability, in societal development, or in beauty) should guide such an architect in attaining a good quality design; such beliefs urge the architect to extend a given project brief and to draw forward possibilities the client did not perceive at the start of a commission. In such a manner, chapter four and six, which revolve around determining opportunities for the detached dwelling, in their mode of enquiry stubbornly look at intrinsic organisational patterns of dwellings. Potential for transformation is sought in abstraction of organisational patterns, relying on studies of the cognitive processes that scientists and architects use in structuring complex issues.[1] These processes were used to reinterpret dwellings and to draw forward alternative interpretations of built forms. This alternative reading responds to the unfavourable disposition of inhabitants and attempts to find simple manners to draw forward

1. See Femi Dogan, and Nancy J. Nersessian, "Conceptual Diagrams in Creative Architectural Practice: The Case of Daniel Libeskind's Jewish Museum," *Arq - Architectural Research Quarterly* 16, no. 1 (2012): 14-27; Femi Dogan, and Nancy J. Nersessian, "Generic Abstraction in Design Creativity: The Case of Staatsgalerie by James Stirling," *Design Studies* 31, no. 3 (2010): 207-236; Nancy J. Nersessian, *Creating scientific concepts* (Cambridge, MA: MIT press, 2008).

possibilities. Still, the results demonstrate that reusing dwellings not only requires technical attention, but also functional (design organisation) and interpretational attention (using narratives to devise future scenarios).

And, making one more step to bring together relevant concepts, this dissertation has also addressed different theoretical frameworks on transformations and the role of (a professional) society in such transformations. Theory of obduracy was discussed because of its focus on artefacts, in this case built objects, which relate to sociotechnical systems (here defined by buildings, building cultures, infrastructure, regulations and patterns of ownership). Sociotechnical studies use a historical perspective to explain (contemporary) forms of obduracy. Wiebe Bijker uses such historical accounts to describe how sociotechnical ensembles develop towards a certain point of closure, a process which incrementally inhibits a flexible interpretation of a technological artefact, which become "stabilized".[2] Theory of transition management was discussed to situate the professional position stakeholders involved in spatial (re)production and management take in. Transition management relates to concepts like path dependency and path creation: Pascal De Decker builds on these concepts, and discerns physical, legal and institutional "structures of reinforced concrete" in the residential Flemish environment.[3] According to his historical analysis, the production and policy behind housing are on a determined path which is difficult to redirect. In comparing these elements of obduracy to parameters indicating a certain potential for change, this dissertation reports of an attempt to find professional approaches of overcoming the paralysis of accounts focusing on the effects of path dependency. This double perspective informs the comparison between two aspects of the problem, namely the artefact and the professional culture dealing with it. The theory of obduracy helped in determining how the detached dwelling is a persistent cultural manifestation, which is strongly tied to even more robust artefacts

2. Wiebe E Bijker, Of Bicycles, Bakelites and Bulbs: Toward a Theory of Sociotechnical Change (Cambridge: the MIT Press, 1995): 217.

3. Pascal De Decker, "Understanding Housing Sprawl: The Case of Flanders, Belgium," *Environment and Planning A* 43, no. 7 (2011): 1647.

such as the constellation of lots and all necessary infrastructure. More than in transition management, it allows the involvement of the perspectives of users, the current and future inhabitants of existing neighbourhoods. Especially since Flemish architecture is often developed on the initiative of, and in close cooperation with, an owner who will also be the inhabitant, studies of obduracy and the built environment provide the opportunity to involve such a perspective, while in transition management, the voice of inhabitants is far more abstract and concealed in regime and landscape descriptions. Theory of obduracy further allows to determine how resistance may be deconstructed, to move to other technologies[4]; this is where it is complemented by transition management. With evolutionary concepts at its basis, it searches for directions where such developments should lead. What this dissertation does underline, is that diverging opinions are being cultivated. This is also a necessity since, depending on the kind of neighbourhood and its location, either careful or rigorous approaches could be applied.

Such comparison can be drawn further in the evaluation of diverging arguments. The registration of differences between the ambitions of professionals and the expectations of inhabitants on such a topic, raises the question how exactly their viewpoints should be weighed and if a single viewpoint should have the upper hand. The architectural analysis delivers an indication of the aptitude and of the limits of the detached dwelling, which can be put into the scale while weighing transformative strategies. Most interviewed inhabitants had no background in a spatial discipline, and were confronted with transformative scenarios for the first time and without preparation. Different generations of inhabitants have diverging demands and expectations of the residential environment, which also depends on the kind of neighbourhood they live in. Moreover, in accordance with the conclusions Han Vandevyvere drew in his doctorate[5], the discussions with inhabitants clearly indicate a certain comfort-inertia that limits the implementation of

4. Anique Hommels, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT press, 2005), 186-189.

5. Han Vandevyvere, "Strategieën Voor Een Verhoogde Implementatie Van Duurzaam Bouwen in Vlaanderen" (unpublished doctoral dissertation, KU Leuven, 2010), 72.

alternatives for the low-density residential neighbourhoods. Many of the residential neighbourhoods which were visited throughout this research have a significant share of elderly inhabitants[6], which might indicate that a new generation is gradually moving in. This indicates a suitable moment to deconstruct the typical resistance of those inhabitants who compose the first generation, and to appeal to viewpoints of a rejuvenating influx. As such, the resistance of older inhabitants should be regarded as a time-specific registration rather than a permanent condition. Professionals, on the other hand, were able to draw a comparison to their own spatial practice and are (most likely) aware of the problem issues if they follow the professional discourse. This allowed them to take in a more distant viewpoint with regard to the strategies, and common lines of thought could be defined. Also they look further into the future. The resilience of the built environment and existing resistance against transformation are aspects taken into account in the everyday work of designers and planning officials. Certainly, most support for more radical approaches (striving for higher density and diversity in the right locations) was encountered among designers, however they are faced with the political overweight of those enjoying small-scale landownership.[7] This demonstrates a problem where spatial improvement is halted strongly by personal interest. A key to attain more interaction between the viewpoints of designers and inhabitants, could be to stimulate (or subsidise) joint development rather than home improvement, thus offering more opportunity for the public interest to develop. If inhabitants of a neighbourhood might become aware of joint interest, this should open up more opportunities for larger design briefs. It is necessary that such briefs are differentiated in terms with location: for example, in one location, owners could be stimulated to join their lots allowing for a scale-jump, while in another location, owners of several connected lots could make part of their property publicly accessible and nurture a local landscape quality, while part of the maintenance goes to the municipality. Such alternative spatial policies could result in novel assignments for designers,

6. As was stated in chapter three (note 13), of the 91 inhabitants who were interviewed, 55 were retired. The average age of these respondents was 64.

7. This refers to the testimonies of designers as reported of in chapter five. For a discussion of the typical role of the architect, see, among others, Hilde Heynen, "Belgium and the Netherlands: two different ways of coping with the housing crisis, 1945-1970," *Home Cultures* 7, no. 2 (2010): 159-178.

who would be able to work out their concepts beyond the level of conceptual idea. Moreover, the aim of designers and planners needs to be directed at distinguishing between the obduracy of the built environment (decreasing the obduracy of undesired housing types) and the obduracy of the neighbourhood framework (for example, reinforcing the obduracy of landscape values). This distinction is elaborated in the following paragraph.

Amending strategies and scenarios: three conclusive visions

In short, diverging perspectives on the feasibility and desirability of diverse spatial strategies, outline a complex interplay of paradoxes and alliances of interests which determine the ongoing transition from one housing model into another one. Thus far, the preceding chapters have put forward different strategies and directed a focus on the detached dwelling as a key object in these strategies. Throughout the dissertation, these strategies have underwent a developmental process. This development has been a result of progressive insight as a result of literature study, of the input of respondents, and of reacting to saturation in the collected qualitative data. In the initial discussions with respondents, each strategy was connected to a specific developmental scenario. The subsequent discussions with professional stakeholders led to a reformulation, which addressed a more complex interaction of these strategies, with one strategy in a primary phase of a scenario leading to altered conditions and implementation of another strategy in a following phase (see **figure 89**). For example, a strategy of replacement changes the conditions of a neighbourhood, which implies that reconfiguration of surrounding dwellings could become advantageous and realistic.

The dissertation will propose a final amendment of the interaction of these strategies, and refines three visions. They demonstrate how particular conditions require a fitting implementation of transformative strategies. These visions are named as follows:

-Readjusting the persistent housing model;
-Initiating transformation with critical projects;
-Anticipating macro-scale developments.

Readjusting the persistent housing model

This vision revolves around incremental densification of existing neighbourhoods, based on bottom-up, individual initiatives, in other words on reconfiguration. The government (mostly on a local, municipal level) facilitates such an approach in those regions where limited densification is in order, by means of adaptation of building codes and cohousing regulations, and most importantly by defining those zones where such limited densification might take place. Its conditions could be summarised by a continued demand for semi-rural housing and private initiative, resulting in stable land value. This vision suits those areas demonstrating a significant persistence of the built environment, and relates to the continued desire among Flemings to live in such a green, semi-rural or suburban neighbourhood. Hence, it is a matter of looking to maximise efficiency in very obdurate neighbourhoods. Opponents argue that it is the level of building quality and spatial organisation which limit the beneficial effects of retrofitting such neighbourhoods. These opponents warn against slackening the reins of policy, as it could cause an uncontrollable development of housing units. This approach should therefore be projected as a short-term scenario with a limited timeframe with regard to inhabitation, directed at the demographic development of ageing and decreasing household size predicted until 2050. In line with such temporary redefinitions, the obduracy of a neighbourhood would change resulting in more opportunities for more collective elements in the neighbourhood landscape. Two transformation

pathways envisioning shared usage of a single detached dwelling can be outlined to fit in this vision.

One specific pathway for change may be termed *selective/rigorous transformation*. It is defined by adaptive re-use of dwellings which display a certain efficiency in the light of such a design approach, and as such may be transformed with a long-term prospective of approximately 20 years.[8] Extrapolating the results of the typological analysis, the number of opportunities which may be found in the Flemish stock of detached dwellings is expected to be rather low. To make use of these benefits would imply a prolonged life cycle of these buildings, which is most beneficial if this occurs in neighbourhoods which demonstrate qualities to match such housing production: centrally located, and well connected to amenities and public transport nodes. This prolonged life cycle also implies retrofitting such buildings in energetic terms. All together, these interventions make this a robust and definitive alteration of the dwelling typology. This very selective thread adds up to the arguments made by Karen Allacker, who states that retrofitting aged houses should depend on additional factors such as location[9], and also typology and flexibility should be considered as such factors. Han Vandevyvere in addition suggests the option to demolish dwellings, which cannot answer to contemporary housing demands, and which are remotely located from amenities: these are proposed to be replaced by alternative buildings types and neighbourhood layouts in better located places.[10] The *selective/rigorous transformation pathway* inevitably implies that a categorisation will indicate a small amount of suitable dwellings, while a much larger amount which will come up for replacement or removal.

Another pathway for adaptation is termed *opportunistic/limited adaptation*. This pathway is defined by an interpretation of adaptive re-use which can be projected on a broad sample of the stock of detached dwellings, also those homes which do not show

8. 20 years corresponds to the lifespan of services and the space plan, while the structure has more permanency. This lifespan is proposed in Stewart Brand, *How Buildings Learn* (London: Penguin Books, 1994): 13; and in Tatjana Schneider, and Jeremy Till, *Flexible Housing* (London: Taylor & Francis, 2007): 169-170.

9. Karen Allacker, "Sustainable Building: The Development of an Evaluation Method" (unpublished doctoral dissertation, KULeuven, 2010).

10. Vandevyvere, "Strategieën Voor Een Verhoogde Implementatie Van Duurzaam Bouwen in Vlaanderen".

clear traits of flexibility such as outlined in chapter five. This pathway accepts typological limitations of dwellings, building on programmatic requirements which fall outside of the scope of contemporary regulations, but which facilitate that alternative residential patterns may be inscribed into common, reoccurring houses. As a result of the limitations of these dwellings, such forms of re-use are rather temporary and reversible, and have a small impact on the typology of the detached dwelling. This pathway is thus characterised by a lower threshold for deciding which dwellings could be shared. This infers that such a concept of dwelling subdivision could be implemented more widely than the previous one. Alternatively, this could involve the design of large additions to the built volume: such an approach is common in practice (see for example **figure 83**) but has received little attention in this thesis, because it depends less on the organisation of the existing house.

In either of these pathways, shared housing concepts should not be considered as *tailor-made* for a specific situation but should revolve around a typological improvement of a dwelling which facilitates multiple forms of inhabitation. Depending on the enactment of supportive regulations[11] about household conditions and cohabitation, on a short term and in significant amounts, temporary housing units might be provided. Not only the rather obvious example of cohabitation of a young family with children who temporarily take care of a grandparent, but a broad gamut of cohousing situations should be catered to. At the same time, this temporality prohibits speculation and decreases obduracy of the built environment, as it facilitates small-scale initiatives of interested home owners. The life cycle of dwellings is prolonged after which re-evaluation of quality and sustainability can occur. If a synergy with improvements in energetic performance is strived for, environmental gain would lie in the reduction of energy use per house as well as per person (because more people use one house) and in the limitation of waste production

11. Such regulation should open up the possibility of home sharing to various groups, without failing to safeguard housing quality.

as a consequence of demolition. Breaking down the traditional interpretation of dwelling in such a way, opens up opportunities to introduce collectivity in the neighbourhood, in cases where smaller housing types require smaller gardens. For example, through the implementation of zoning plans as a compensation for a more liberal housing policy, stimulating the cultivation of forest vegetation throughout a residential forest, which is maintained by the community and the municipality together. As such, the resilience of the forest landscape is increased. This developmental vision, involving a distinction between the obduracy of built typologies and of the underlying landscape, is summarised in **figure 104**. Anique Hommels has discussed a number of arguments which are typically proposed to keep existing structures in place.[12] In the case of this vision, mainly her arguments emphasising continuity and investment of existing residential neighbourhoods might be recognised. While the continuity of the built structure is re-used, small technological and social changes are addressed by traditional regime actors in housing production, readjusted under influence of concepts developed in professional niches.[13]

Initiating transformation with critical projects

This vision revolves around a more fundamental development, guided and structured by a government who actively facilitates top-down interventions, in which powerful players such as real estate developers take in a more important role. It is characterised by a continued interest in semi-rural housing, but differs in a demand for alternative housing types. As discussed in chapter five, replacement strategies could have parasitic or systemic effect on their environment, also leading to small-scale reconfiguration or even removal in the surrounding area – thus combining all three strategies. A long term perspective is essential (beyond the horizon of 2050), as neighbourhoods will be changed more definitely. Intrusive proposals involve the reorganisation of property, and require a good location to make the investment worthwhile. Site-specific aspects are more important than dwelling quality in the

12. Hommels, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT press, 2005), 189-192.

13. This corresponds with the typology defined by Geels and Schot as a *transformation* path. See Frank W. Geels, and Johan Schot, "Typology of Sociotechnical Transition Pathways," *Research Policy* 36, no. 3 (2007): 406-408.

light of this vision. In the first place, such strategies should be implemented in well-connected areas, where public transport is available. Furthermore, there should be opportunities to move up a scale, in other words to join lots together. In the wake of such interventions, dwellings in the surroundings of a *parasite* become eligible for re-use because of their proximity, and as such a pathway of *opportunistic/limited adaptation* should be anticipated. While the quality and the fit of apartment buildings in small village centres have been criticised by inhabitants and spatial designers alike, replacement of detached dwellings with alternative housing types in the 20th century periphery could relieve pressure of historical centres. Flemish urbanism has seen a historical development averse to centrality. housing has been scattered across the territory, following the spread-out organisation of work centres[14], and also the fine-grained transportation network, of which the nodes in rural Flanders were inserted quite remotely from the village centres, creating new satellites for housing and amenities.[15] In later stages of (sub)urbanisation, landscape qualities of forests and noble domains started to draw the interest of developers and suburbanites. As a result, traditional centres do not by definition withhold a better condition for densification than a residential satellite such as an allotment. Especially in the density of the Flemish Diamond, this dispersal offers a logic for diversification of the uniform and placeless examples of sprawl, differing from the transformation of village centres. This strategy would have a more significant influence on energy consumption in the phase of usage, while utilities and infrastructure could be kept in function and made more efficient. But this will also involve more waste production as more houses are being demolished. Intrusive replacement of detached dwellings with alternative housing types is sought for by architects who try to break with persistent traditions of individual housing production by proposing concepts which illustrate how these actors aim to break with the traditional past.[16] On the other hand, landscape structures in this vision obtain more obduracy, and on a larger scale, connection can be sought

14. As is argued by Michael Ryckewaert, Building the Economic Backbone of the Belgian Welfare State: Infrastructure, planning and architecture 1945-1973 (Rotterdam: 010 Publishers, 2011).

15. These satellites often took the name of the town, with the addition 'Statie' (train station). Also see Greet De Block, and Janet Polasky, "Light railways and the rural–urban continuum: technology, space and society in late nineteenth-century Belgium," *Journal of Historical Geography* 37, no. 3 (2011): 322.

16. See the categorisation of unbuilding strategies in Hommels, *Unbuilding Cities*, 187.

with regional and provincial ecological structures. In this vision, concepts emerging from niches become more important and as a result of continuous pressure from macro-scale developments, gradually reconfigures dominant professional regimes.[17] This developmental vision is represented in **figure 105**.

17. As is proposed in the *reconfiguration pathway* which is described by Geels and Schot, "Typology of sociotechnical transition pathways": 411-413.

Anticipating macro-scale developments

The last projective vision involves scenario elements such as a local drop of housing demand, affecting the stock of detached houses in decentralised locations, together with an increased demand for alternative housing types close to amenities or urban centres. This scenario envisions exacerbated consequences of climate change and sprawl (in Flanders, flooding in river estuaries is such an issue), in response to which government takes a very active role as a booster of land consolidation, leading to the transferral of the 'buildable' label from remote an ill-located lots to central locations. Reconfiguration, in the sense of *selective/rigorous transformation* of dwellings plays a part in this vision for those specific locations which are desired to be kept intact and liveable, such as small hamlets. Houses would be demolished in locations which are labelled unsuitable – location becomes critical, over building quality. This unsuitability needs to be constructed with arguments over a long period of time, in order to render it socio-culturally and legally viable. The strong opposition against such a strategy is expected to gradually decrease due to the exacerbated macro-scale problems. Concepts with significant impact, such as demolition of houses in areas unsuitable for inhabitation due to reasons such as flooding, accessibility, or ecological values, may be developed in niches, but will only start to have significant impact on the regime after negative aspects of the current housing model and mode of production become more clear and perceptible – therefore, the developments on the level of the sociotechnical landscape are influential. At such a point, the current regime characterised by private building commissions in rural municipalities is replaced by a new regime. Most realistically, such development is envisioned

on the scale of a municipality or a neighbourhood, so that a direct interrelation between replacement and removal strategies becomes defendable to local inhabitants. Proponents of this vision acknowledge that transformation strategies will be disruptive and require compensation and feasible alternatives. Unbuilding strategies are therefore based on negotiating and softening the rigidity of housing in the countryside, while municipal ecological values are strengthened.[18] The final scheme in **figure 106**, organises this vision complementing the former two.

18. See the categorisation of unbuilding strategies in Hommels, *Unbuilding Cities*, 187.

Case-specific perspectives: the functioning of strategies in selected municipalities

In the following section, The outlined visions will be made more concrete by means of a projection on three out of the ten case studies. Without having the ambition to present exclusive answers, the perspectives outlined below do intend to exemplify possible developments, which are framed by the visions. These municipalities are selected because together they illustrate diverse conditions, which require diverse development approaches. Two of the cases, Keerbergen and Aartselaar, are both situated within the Flemish Diamond. Keerbergen demonstrates rather poor conditions in terms of connection to transport networks, while Aartselaar is surrounded by train infrastructure, main motorways, and very close to the city of Antwerp. The third case, Wortegem-Petegem, demonstrates a very fragmented settlement pattern, small village centres and very low housing densities.

The case of Keerbergen demonstrates a municipality centrally located in the Flemish Diamond, with a significant section of its surface subdivided and taken in by detached dwellings (see **figure 5 and 16**). The residential forest is characterised by a mix of old and new dwellings. A clear distinction can be made between the older, more modest homes, and more recent, luxurious villas (see **figure 17**). This hybridity provides a window of opportunity for development differing from the traditional mode of housing

production. Extrapolation of the continued pressure on the housing market[19], and communal concerns for loss of the quality of the forest in which these houses are built, render a trajectory of incremental development plausible. Selective reconfiguration of high-quality existing dwellings could be stimulated in order to allow for more inhabitants and multiple households inhabiting a single dwelling. Since houses too old are expected to be replaced because of the steep land prices, readjusted zoning plans could stimulate builders to construct new dwellings which allow more flexibility form the start. Such an alternative zoning plan would manage the efficiency of spaces, proper orientation and equal dimensioning, instead of imposing a rural outlook for example. The consideration of different climate zones within a house can also be a part of such regulations; this allows for a seasonal flexibility within the dwelling.[20] But also another kind of relationship to the forested landscape, less defined by privatization, could diversify the area.[21] Such a strategy has the benefit that the existing built footprint is used more efficiently, without turning to actual densification. In summary, the private interests are considered to be robust and dictate the limits of transition, but can be coupled with an overarching interest for more flexible housing (allowing for slightly more inhabitants) and maintenance of the green and open forest character. This approach is visualised in **figure 107**.

While the case of Keerbergen illustrates the sense of one singular vision (*readjusting the persistent housing model*) to optimise a rather obdurate neighbourhood, Aartselaar is put forward here as a case which indicates potential for an approach combining multiple strategies, effecting a stronger development. This municipality is part of the complex suburban network around Antwerp, and part of the ribbon of work centres along the A12 motorway is on its territory (see **figure 6**). The town core is situated amidst motorways, rail infrastructures, and scattered residential allotments. The neighbourhood Lindenbos lies detached from the town centre, but is close to amenities in other municipalities.

19. Both the alderman of Keerbergen, and the real estate agent operating in this municipality, discussed this pressure during the conducted interviews.

20. This concept was developed by a group of KU Leuven students in their entry for the Solar Decathlon Competition 2013, which is reported of in the Master thesis of Anne-Sofie Verheyen, "Kavel per Kavel, Onderzoek naar duurzame alternatieven voor de klassieke verkaveling in Vlaanderen" (unpublished Master thesis, KU Leuven, 2012).

21. Since such replacements still are based on the concept of the freestanding house, this is not to be considered an example of a replacement strategy as described throughout the dissertation.

It is connected to a long ribbon development, which arches the entire south and east side of the municipality (see **figure 7**). The municipality has already implemented a RUP to protect one of the remaining open areas in its territory (see **figure 88**).[22] The Lindenbos neighbourhood, which is a neighbourhood with a very mixed housing stock consisting of detached dwellings, row houses and drive-in dwellings, could be further developed into a node with higher density, by replacing aged dwellings with larger buildings. This is because in such a varied neighbourhood, the threshold to redefine the rules of the game is lower than in a high-end villa area, where alterations would be more conflictive with the expectations of inhabitants who explicitly seek an inert, low-density residential environment. This could provide housing opportunities to take pressure off the ribbon developments which are enveloping the remaining open spaces. Here, a mixed policy of transforming qualitative dwellings, and removing obsolete and aged houses, could open up opportunities for landscape recovery. The overarching interest which is appealed to, is the continuous need for affordable housing in an urbanised region, which may be combined with diversification and strengthening of the open and green space which is left. This diversification interacts with alternative housing typologies, as public, semi-public and collective open spaces may be made part of the urban tissue. Private interests are catered to by providing good-quality, well-adapted housing types to current home owners in the neighbourhood. See **figure 108** for a visualisation.

22. Also see the discussion of this plan in chapter five.

The former two municipalities are located within the area defined as the Flemish Diamond, Wortegem-Petegem (**figure 20**) is not. This municipality stood out because of its very dispersed settlement pattern, with scattered dwellings and small clusters of houses. Here, three sectors were considered, which have a decentralised location in the municipality itself. Each of these neighbourhoods lies in the periphery, but also within the proximity of the neighbouring towns of Waregem and Oudenaarde, which have train stations and more

amenities than the hamlets of Wortegem-Petegem. This gives such low-density neighbourhoods an ambiguous quality when compared to the small village centres. This municipality has seen initiatives to develop apartment buildings in the main centre (the village of Wortegem) which have proven quite unsuccessful, while there is an ongoing dispersed housing production, which has proven difficult to contain by the municipal planning department.[23] The attraction of the municipality should be sought in the landscape qualities which draw households from outside the municipality, while an ageing generation has a strong bond with their residential location.[24] This complexity requires a different emphasis of development approaches. The strategy combining an energetic retrofit with typological adaptations aiming for flexibility, could be projected on the hamlets and villages, in order to develop more resilience of these historical centres without rigorously changing their outlook. Replacement strategies could rather transform the peripheral residential locations, which will be illustrated for the case of the hamlet Moregem and its ribbon developments (**figure 21**). The replacement strategy here could assist in developing a new rural residential type, which caters to the attachment of local inhabitants to their native soil, with a more compact building form which organises a more open access to the landscape. This typology differs from common apartment buildings in its relation to an open landscape instead of a small townscape, and differs from the detached dwelling in offering a housing type which is suitable for smaller and older households. Such a building could make use of the utility networks which are already in place, without overloading these, as the increase of households is limited. A close interaction between replacement and removal strategies might occur on a small scale by providing neighbours with the opportunity to coproduce a compact residential building, while aged dwellings make place for landscape restructuring. Also this case is illustrated, see **figure 109**. Here, the overarching interest is protecting the character as well as the liveability of such a small, but appreciated hamlet. Again, current home owners might see

23. As documented in the interview with Isabelle Vanderlinden, of the municipality of Wortegem-Petegem, see chapter five.

24. This contrast was encountered in other, comparable rural municipalities, such as Alken and Lummen. See Wouter Bervoets, and Marijn van de Weijer, "Paradoxen Van Landelijk Wonen in Vlaanderen," *Agora* 28, no. 1 (2012): 34-38.

a personal interest in having the opportunity to obtain a house suitable to age in, in a better way than the detached dwelling.

25. Petter Naess, "Urban Planning and Sustainable Development," *European Planning Studies* 9, no. 4 (2001): 503-524.

A final revision of concepts – pathways for housing, the architect, and practice-based research

These concrete, spatial situations, linked to the outlined visions, serve as an argument in favour of a transition process which is mainly operational on the local scale level of a municipality or an area covering networked municipalities. The dispersed Flemish settlement pattern requires strategies which specifically address local intricacies. The inference can be made that in such low-density residential environments, a search for a more sustainable housing pattern should mediate between viable and radical improvements: proposals should diversify the housing stock, make it more energy-efficient, but also not be too radical, in order to prevent strong resistance. Related to that argument, urban planner Petter Naess, in his discussion of concepts of sustainability between the compact and the dispersed city, emphasises the importance of transforming existing built-up areas. He questions the sense of implementing new, more energy-efficient areas, next to the existing, energy-inefficient, low-density stock of houses.[25]

Setting in motion feasible transition processes relating to such neighbourhoods, involves the implementation of strategies – even the more intrusive ones – according to the needs and capacity of the local community. The inertia of the detached dwelling and the low-density residential environment, according to this analysis, can be made more flexible on this *intermediate* scale of the municipality: policy envisioning a transition should exceed the *micro* scale of the dwelling, in order to address overarching interests and supersede personal interests; it should also lead to interventions which can be argued to provide direct benefits to those involved stakeholders, mainly the municipalities and their inhabitants. This corollary mitigates the verdict which may be passed solely on the basis of macro scale projections or mappings, which should rather

inform and argue in favour of the implementation of distinguished local transition strategies. Mapping potentially provides the information for the regional government to support and guide the municipalities in choosing and implementing such strategies. Considering a transition of the housing model, should improve the life cycle and quality of smaller municipalities. This can be done with help of the proposed development of a more varied toolbox, diversifying beyond the creation of classical allotments.

Over the course of the four years in which this project ran, many publications, exhibitions and exemplary projects took shape in response to the question how to obtain more sustainability in (residential) Flanders. Roughly, a distinction can be made in those thinkers who strictly propagate centrality and compactness, and those thinkers who acknowledge the reality of the Flemish dispersal and look for ways to inscribe more efficient usage in the reality of the context. The concepts proposed here connect to the insight of this latter group of thinkers. Based on the findings of this research, it is unlikely that simply striving for compactness will provide feasible answers for the Flemish condition. In the near future, under conditions of the growing population and housing demand, new construction can only contribute to more sustainability if the existing housing stock is retrofitted or replaced, and given the fact that such a large part of Flemish dwellings is built in allotments, it is necessary also to consider alternative futures for these obdurate housing environments. Compactness in the residential environment is one aspect of the solution, but should also be accompanied by a different lifestyle.[26] Allotments were devised as green, residential environments where one could live in a safe, secluded and privatized environment, closely connected to anywhere via the driveway, the cul-de-sac and the motorway. The same goes for ribbon developments, where small-scale opportunism maybe even has a stronger foothold. Small villages, such as the small hamlet of Moregem, lose their historic relation to the landscape, and are overshadowed by the residential

26. Veronique Van Acker, "Spatial and Social Variations in Travel Behaviour: Incorporating lifestyles and attitudes into travel-behaviour- land use interaction research" (PhD thesis, Ghent University, 2010).

ribbons where commuters build their house. While all these infrastructures could be used in different ways (under different societal conditions), in contemporary society these residential environments are strongly related to the aura of privacy, personal property, seclusion, and of suburbia. The architect has a role in deconstructing this aura by intervening with projects of sufficient critical mass, and to direct a search for redirected futures of these peri-urban neighbourhoods. This perspective also developed to include methods on the level of urban design, as it proved unproductive to focus solely on the level of the dwelling and its interior. As the examples above intend to show, denser allotments would attain more urbanity and could also support additional functions, but also shared property and landscape continuity. Small villages could offer housing and functions for those attached to these villages emotionally: smaller housing units with less private property, to cater to an ageing generation instead of commuters. In short, alternative lifestyles are essential. This makes for a complex chicken-and-egg situation, defined by slowly changing lifestyles, and an equally slowly changing housing supply.

At this point, the 'insurgent architect', as described by David Harvey, comes to the fore.[27] Indeed, the Flemish architect needs to exhibit some insurgency with regard to the traditional system of spatial production in order to propagate alternative housing models. This becomes clear when making a comparison to the author's national background, traditionally distinguished by the powerful clients, who issue big assignments. Many of these assignments have envisioned the renovation of existing residential neighbourhoods. Quite a contrast are the invasive transformations of post-war residential neighbourhoods, such as for example the modernist garden city suburbs of Amsterdam. These districts were developed in line with the AUP – the general expansion plan for Amsterdam, under supervision of modernist urban designer Cornelis van Eesteren. The radical, contemporary transformations (13.000 existing dwellings are being demolished and replaced

27. David Harvey, "The Insurgent Architect at Work," in *Readings in the Philosophy of Technology*, ed. by David M. Kaplan (Lanham: Rowman & Littlefield Publishers, inc., 2004): 337-353.

with 24.000 new ones between 2000 and 2015) follow a perceived dissatisfaction with residential typology, neighbourhood diversity and infrastructure, and are driven by influential social housing companies joint in a conglomerate.[28] Architectural critic Bernard Hulsman describes how respect for the work of Van Eesteren leads critics to formulate negative responses on the contemporary interventions, while in his view, the designed urban armature provides the flexibility to host new kinds of architecture.[29] In the context in Flanders, theoreticians equally disagree about the quality and potential of suburban neighbourhoods. Professionals observe typology-related problems, but operate without a large-scale overarching concept, since property is divided in small pieces, between owners who have a very different take on the intrinsic problems of housing. Many allotments and ribbon structures have erased earlier frameworks, and do not provide an urban quality in return. Designers and planners need to depend stronger on their own creativity to define high quality frameworks that can serve as armatures for alternative infill projects. The architect, possibly more than in the Dutch context, needs to develop methods to critically interact with municipalities and potential clients, in order to assume the role of a responsible professional, from his or her training on. Already, the effort of the Flemish Government Architects have facilitated new forms of public commissioning that diversifies architecture in Flanders.[30] It is the opinion of the author, that a more refined combination of design and research should lie at the foundation of such a formation, and could be complementary to the state-sponsored public commissioning.

This project has developed a role for design which took shape as a mode of communication, as a method of analysis, and as a mode of enquiry resulting in scenario narratives. This methodology developed in response to the interdisciplinary cooperation of this research project, to a complex spatial condition, and to the ambition to contribute to changing this condition. It also developed as the initial phase of the project pointed out that there was no single

28. Theo van Oeffelt, Bernard Hulsman, Kees de Graaf, and Luuk Kramer, *Nieuw Nieuw-West: Stedelijke vernieuwing in de Amsterdamse tuinsteden 2000-2010* (Bussum: uitgeverij TOTH, 2010).

29. Hulsman discusses this in his essay, "de nieuwe beslotenheid", in: Van Oefelt et al., *Nieuw Nieuw-West*, 22-23.

30. Madeleine Maaskant, "Interview with Marcel Smets, Flemish Government Architect (2005-2010)," *OASE*, no. 83, Commissioning Architecture, (2010): 99-106.

clear project brief or programme. The scope of the project to search for diversity and density was equally deemed to be too ambitious (for example by satisfied inhabitants) or not ambitious enough (by engaged designers). As a result, design developed as a contribution to a more neutral methodology in documenting arguments for and against transformation. Opting for this interpretation of practice-based design, leads to a certain hiatus, inherent to a discrepancy with common interpretations of (architectural) design. A finished design in architecture would provide a clear statement of a solution for a problem which was set in a project brief, or as a result of a (designerly) analysis. Although not all aspects of a stated problem will be resolved in an equal way – design, after all, also involves a continuous problem definition process, which is ran by every designer in his or her own way[31] – the end result most commonly is a product which a designer stands by, and which is considered a valid response to the stated or redefined problem. To a certain extent, this dissertation has pointed out the importance of crossing scales: remaining on the level of the building could only lead to the treatment of symptoms of higher order issues. Furthermore, the chosen approach allowed for comparison of arguments on an abstract level, but also proved to have its limitations especially when discussing design strategies with designers who are used to base their decisions on a deep understanding of a specific site or condition. The author is aware that such local and specific investigations are an essential contribution to the understanding of potential transitions of the housing model, and should be further enquired into; hence, this thesis proposes a tentative interpretation of practice-based research. The author ambitions to further enquiry into this methodology, however by addressing subjects with more attention for a case-based, site specific context, and with a desire for transformation coming stronger to the fore in a local society. This involves searching for a form of output which lies closer to the field of architecture, and with more relevance to its disciplinary discourse.

31. Kees Dorst, and Nigel Cross, "Creativity in the Design Process: Co-Evolution of Problem-Solution," *Design Studies* 22, no. 5 (2001): 425-437.

This form of practice-based research also should be connected more firmly to higher education of designers, not in the last place in order to train critical professionals who can put weight in the scale taking into regard their important part the process of housing production. On the basis of the experiment reported of in this dissertation, the incomplete experience of students with the assignment here at hand was as a limiting factor. Research through design should provide students the opportunity to critically reflect, and this can only be done properly if these students have enough knowledge of common practices to assume such a critical position. Research through design should as such be a final piece in an architect's training, after thorough study of common and best practices, so that contributors to an endeavour of designerly research share an almost equal starting position and are confident to propose concepts and ideas in a context of creativity and debate – students, researchers and tutors alike.

Related research endeavours and perspectives for further research

The research project *Large, Underused Dwellings in Flanders,* and this trajectory of typological and designerly research in particular, have aimed to make a small contribution to a search for an improved housing stock, in the light of changing demographical, ecological and socio-economical demands. The chosen research path has crossed with diverse disciplinary perspectives. Some of these perspectives are explored further in ongoing research projects. The Flemish policy centres for housing and for spatial development[32] conduct several research projects with a similar interest, but with a differing scope and focus. Within the policy centre for housing, a research is being conducted by Jurgen Ceuppens on spatial-selective housing policy, which investigates the possibility of an alternative division of regions.[33] This alternative division could facilitate housing policy and subsidising based on morphological and geographical conditions, making housing available in those locations where it is needed and fitting, in terms of price, mobility

32. The Flemish policy centres (Steunpunten voor Beleidsrelevant Onderzoek) operate since 2001, when they were instated by the Flemish government to provide scientific support for its policy. Currently, the third generation is operational (2012-2015). See http://www2.vlaanderen.be/weten/steunpunten/index.htm [accessed 25 November 2013].

33. "Ruimtelijke selectief woonbeleid. Sturingsmogelijkheden en productiewijzen van het wonen in Vlaanderen." See http://www.kuleuven.be/onderzoek/onderzoeksdatabank/project/3E13/3E130183.htm [accessed 25 November 2011].

or ecology. His research aims to map the mode of housing production and will make an inventory of influential actors in the planning and building process. Additionally, the policy centre for spatial development is currently responsible for a project studying the concept of polycentricity as a model for structuring urban development in the Flemish region. Within this interdisciplinary project, the investigation conducted by David de Kool at the KU Leuven[34] addresses different interpretations and implementations of the concept of polycentricity in urban planning and design practices, and enquires what is the potential in the Flemish context. It does so by mapping the Flemish built-up landscape, and looking for indicators of centrality and dispersal which determine how design strategies should and could be developed. Also at Hasselt University, the Flemish housing model and the predominant detached dwelling continue to be a topic of interest, in a research project conducted by Barbara Roosen, who explores the potential which lies in the oversize of the lot and the garden, and which investigates principles of capacity building and spatial design concepts for a sustainable requalification of low-density allotments. Outside of academia, the search for a better adapted residential environment that was commenced with the Flemish pilot project housing is being continued. After a regional call, five potential clients have come to the fore which will commission design projects that take as a starting point the values explored in the conceptual research of five design teams, such as collective commissioning, diversification, and involvement of public and collective space.[35]

In order to add to this research spectrum, several paths for further research can be outlined, based on the conclusions put forth in this synthesising chapter, and holding on to the approach to study concrete conditions of specific objects and places. One direction for further exploration would be the search for a more close, co-productive investigation, combining academic and professional architectural perspectives. Such an approach could improve the

34. "Residentiële landschappen in een polycentraal Vlaanderen". See http://www.steunpuntruimte.be/index.php?option=com_content&view=article&id=17&Itemid=57&lang=nl [accessed 25 November 2013].

35. Declerck et al., 2013. The process of the pilot project is reported online. See: http://www.vlaamsbouwmeester.be/thema's/wonen/nieuws.aspx [accessed 25 November 2013].

much needed interaction between researchers and practitioners in the discipline of architecture, and as such develop a more elaborate exchange. This would also surpass the hiatus in this dissertation, where prototypical and generic concepts have been studied more elaborately than concrete project cases. With such an approach, parties interested in transformation and strategies alternative to the common mode of housing production, could receive more attention. Such an interaction would furthermore be able to further elaborate the strategies of overcoming obduracy and resistance in the face of continuous societal and environmental developments.

Also, subdivision of dwellings has been researched throughout this dissertation taking into account very specific conditions, defined by the existing, post-war detached dwelling and its current inhabitant. Changing these parameters could lead to a better understanding of the potential of strategies aiming at adaptively re-using and sharing residential buildings. On the scale level of the neighbourhood, a potential research trajectory could be to elaborate place-specific design experiments developed from the prototypical design strategies discussed in this dissertation. This chapter has proposed a differentiation and interaction directed at exemplary specific municipalities by proposing a set of interrelated design strategies for these cases, which requires further exploration. Such an endeavour could improve understanding about the transformation of low-density neighbourhoods by projecting very concrete projects. A possible pathway for deepening the insights in the complexity of transformation and transition, is the exploration of design strategies based on concrete cases, while broadening the scope, by including other disciplinary perspectives, which, for example, may take financial and energetic criteria into consideration. This would also involve a close interaction between professional designers and the world of academia, to further bridge the gap between practice and academic study.

A final suggestion would be to further explore the potential of a design-based methodology as was set out in this dissertation. Throughout the work, instruments typical of design have contributed to data collection, analysis and interpretation. This approach has been developed in the light of the particular research questions, and the specific topic of study. It could prove interesting to further test this approach on other spatial issues and building typologies, to determine its flexibility and validity as a research methodology proper to architecture.

Appendices

Appendix 1. Tables chapter 3

These tables, elaborated by D. Vanneste and L. Vanderstraeten, are part of the manuscript submitted for publication: Wouter Bervoets, Marijn van de Weijer, Dominique Vanneste, Lieve Vanderstraeten, Michael Ryckewaert, and Hilde Heynen, "Towards a Sustainable Transformation of the Housing Stock in Flanders, Belgium," *the Journal of Urbanism: International Research on Placemaking and Urban Sustainability* (2014, forthcoming).

Table 1 (Underused) Detached dwellings according to the degree of urbanisation
Data: SEE 2001; Analysis: D. Vanneste & L. Vanderstraeten

Degree of urbanisation	**Detached dwellings**			**Underused detached dwellings**			
	Abs.	% (total detached dwellings in Flanders)	% (total housing stock in degr. urb.)	Abs.	% (total detached dwellings in degr. urb.)	% (total underused detached dwellings in Flanders)	% (total housing stock in Flanders)
Agglomerations	152.141	18,3	17,3	68.899	45,3	20,7	3,0
Urban fringe	165.665	19,9	53,1	67.665	40,8	20,3	2,9
Commuters' zones	214.344	25,8	42,1	83.876	39,1	25,2	3,7
Small towns in the countryside	118.838	14,3	44,1	46.004	38,7	13,8	2,0
Rural areas	180.690	21,7	55,1	66.929	37,0	37,0	2,9
Flanders	831.678	100	36,2	333.373	40,1	100	14,5

Table 2 Indicator of potential for re-use and densification of underused detached housing
Data: SEE 2001; Analysis: D. Vanneste & L. Vanderstraeten

Variable	Categories	Score	Max. score	Min score
Age and renovation of the dwelling	- Built after 1980 - Built before, renovated during the last 10 years - Built before 1980, not renovated during the last 10 years	2 1 0	2	0
Size of the dwelling	- ≥ 125 m² - 105-125 m² - < 105 m²	2 1 0	2	0
Insulation	- Double glazing - Insulation of the roof - Insulation of the outer walls - No insulation	1 1 1 0	3	0
Distance to the 12 major and regional cities (incl. Brussels)	- < 5 km - 5 – 10 km - 10- 20 km - 20-40 km - ≥ 40km	4 3 2 1 0	5	0
Availability of public transportation	- Station in the neighbourhood - No station in the neighbourhood	5 0	5	0

Availability of local retail and services	- Core neighbourhoods (in all degrees urbanisation)
	- Secondary neighbourhood adjacent to core in urban aggl. or small cities
	  - hab/ha > 25
	  - hab /ha < 25 and > 15
	  - hab /ha < 15
	- Secondary neighbourhood in urban aggl. not adjacent to core
	- Secondary neighbourhood in small cities not adjacent to core
	- Secondary neighbourhood adjacent to core in urb fringe or comm zones
	  - hab /ha > 25
	  - hab /ha < 25 and > 15
	  - hab /ha < 15
	- Secondary neighbourhood not adjacent in urb fringe or comm zone
	- Secondary neighbourhood adjacent to core in country side
	  - hab /ha > 25
	  - hab /ha < 25 and > 15
	  - hab /ha < 15
	- Secondary neighbourhood not adjacent in country side
		8
		
		6
		5.5
		5
		4,5
		4
		
		3,5
		3
		2,5
		2
		
		1,5
		1
		0,5
		0
			8	0

Note: the maximum score for 'Distance to the 12 major and regional cities' implies that a neighbourhood can cumulate proximities to several major and/or regional cities.

Appendix 2. Interviews with specialists

Tom Schoeters, real estate agent Winston Schoeters, Keerbergen	12/05/2011
Luc Cools and Bernadette Bosmans, real estate agents Immo 2000, Retie	17/05/2011
Roel Druyts, real estate agent Heeren & Hillewaere makelaars, Oud-Turnhout	24/05/2011
Willem Vandevelde, real estate agent Immo 3000, Linden	05/09/2011
Benoit Boes, real estate agent Engel & Völkers, Hasselt	06/09/2011
Angèle Janssen, urban planning official Alken	06/09/2011
Marc Vangrunderbeeck, alderman spatial planning, urbanism and housing, Keerbergen	14/09/2011
Tim Houben, urban planning official Overijse	07/09/2012
Johan Weyts, urban planning official Retie	11/09/2012
Luc Gelaude, urban planning official Sint Martens-Latem	18/09/2012
Isabelle Vanderlinden, urban planning official Wortegem-Petegem	18/09/2012
Philippe Swartenbroux, PULS architecten, Antwerpen	26/03/2013
Guido Geenen, WIT architecten, Leuven	02/04/2013
Danny Vaes, Intercommunale Ontwikkelingsmaatschappij voor De Kempen, Geel	04/04/2013
Saidja Heynickx, architect, Aarschot	23/04/2013
Peter Vermeulen, Stramien, Antwerpen	26/04/2013
Lien Vandenbosch, urban planning official Lummen	29/04/2013
Dirk Somers, Bovenbouw architecten, Antwerpen	03/05/2013
Dirk Gillekens, architect, Huldenberg	06/05/2013
Victor Simoni, Simoni architecten, Hasselt	07/05/2013
Henk De Smet, De Smet Vermeulen Architecten, Gent	15/05/2013
Roger Van Horenbeek, urban planning official, Lubbeek	16/05/2013

Alexander Dierendonck, Dierendonck Blancke Architecten, Gent	24/05/2013
Bettina Wullaert, urban planning official Aartselaar	28/05/2013
Leen Mermans, urban planning official Vorselaar	26/09/2013

Appendix 3. Documented dwellings

	Date of home visit	architect	Year of construction	Surface of living quarters (m²)	Useable surface (m²)	Lot size (m²)
H_01	30/08/2010	architect unknown	1994	199,1	359,9	2679
H_02	30/08/2010	Van Hoof	1976	129,0	248,0	1578
H_03	06/09/2010	E. M. Wuyts, team teknisch advies	1974	154,4	270,7	1336
H_04	06/09/2010	architect unknown	1973	150,3	413,0	2082
H_05	07/09/2010	Jan Troch	1977	163,4	274,7	3903
H_06	29/09/2010	architect unknown	1992	153,5	272,4	2076
H_07	04/10/2010	architect unknown	1970	166,7	320,2	2553
H_08	06/10/2010	Lovika	1974	107,0	225,7	980
H_09	07/10/2010	D. Depoorter	1979	235,5	399,5	2123
H_10	19/10/2010	architectenburo Roland Abels	1990	158,7	274,7	1854
H_11	12/02/2011	A. Croonenberghs	1976	117,8	161,2	957
H_12	14/02/2011	architect unknown	1957	?	?	753
H_13	15/02/2011	Henri Maes	1970	154,3	185,7	2261
H_14	15/02/2011	G. L. Poncelet	1965	144,8	251,8	719
H_15	02/03/2011	Jos Bex, bvba KREJO	2003	137,2	326,7	890
H_16	21/04/2011	L. Janssens	1972	96,4	195,9	922
H_17	22/04/2011	Frans Martens	1983	153,8	283,9	3207

H_18	26/04/2011	Ivo Vercaeren	1995	?	?	3243
H_19	26/04/2011	Jo Crepain	1990	226,4	438,9	3000
H_20	28/04/2011	Dirk Luysterborg	1982	91,7	203,8	3323
H_21	05/05/2011	architect unknown	1995	171,5	262,0	2628
H_22	10/05/2011	De Coene Construct	1978	182,5	382,0	2976
H_23	10/05/2011	architect unknown	1975	?	?	1633
H_24	10/05/2011	Marcel Reymen	1965	211,0	315,1	15363
H_25	12/05/2011	architect unknown	1977	184,7	382,8	3999
H_26	22/06/2011	architect unknown	1969	134,3	206,3	1792
H_27	03/10/2011	Dirk Martens	1979	139,9	328,5	2064
H_28	07/10/2011	R. A. Van Driessche	1976	252,7	474,4	3909
H_29	07/10/2011	André Jacqmain	1950	?	?	3360
H_30	07/10/2011	Dominique Vandekerckhove (renovation)	1976	161,2	306,3	1078
H_31	10/10/2011	L. Vermeersch	1994	289,4	618,0	3358
H_32	10/10/2011	architect unknown	1968	95,4	177,0	2121
H_33	10/10/2011	Tine Van Besien, *AIKO*	2004	179,0	411,2	2716
H_34	18/10/2011	Bouquet	1976	152,1	242,5	1472
H_35	18/10/2011	W. Remmery & A. Vangheluwe (Danilith)	1966	78,7	141,0	1499
H_36	19/10/2011	D. Van Quickenborne	1970	181,8	332,1	3212
H_37	19/10/2011	Dan Grootaert	1969	219,6	379,9	2780
H_38	19/10/2011	G. Batteau, inhabitants	1969	207,1	323,6	1423
H_39	08/11/2011	Michel Verougstraete	2000	197,1	540,7	3392
H_40	08/11/2011	J. A. Vanquaethem	1972	105,7	173,3	1288
H_41	16/12/2011	E. Verbeurgt	1970	106,1	176,0	2936

H_42	2/04/2012	Jean Demeere	1977	154,5	285,9	1806
H_43	4/04/2012	Marc Devisscher, URBS architecture et environnement	1983	128,3	261,1	3543
H_44	04/04/2012	architect unknown	1972-1974	128,0	246,0	710
H_45	19/04/2012	Jacques Vandersmissen	1976	112,6	228,7	750
H_46	25/04/2012	E. G. Rulens, P. Vissers, A. Moreno	1974-1975	65,6	126,1	449
H_47	04/06/2012	D'Anvers & Geerts	1989	136,1	210,3	683
H_48	19/09/2012	architect unknown	1973	131,5	201,4	724
H_49	26/09/2012	André Castagne	1981	145,0	225,0	543
H_50	26/09/2012	architect unknown	1969	140,6	296,7	1387
H_51	11/10/2012	architect unknown	1973	143,3	274,7	2764
H_52	22/10/2012	W. Goovaerts	1962	?	?	726
H_53	23/10/2012	Luc Van Raemdonck	1971	133,7	204,5	613
H_54	23/10/2012	Architektenbureau Lernout, int. arch. Van Roosmaele	1976	163,3	269,0	2021
H_55	25/10/2012	R. La Planche	1970	71,9	168,7	399
H_56	25/10/2012	Xav. De Cuyper	1972	93,5	158,0	460
H_57	26/10/2012	E. Delpierre	1966	107,6	219,7	530
H_58	08/11/2012	Leo Smet	1973-1975	109,7	173,1	570
H_59	08/11/2012	architect unknown	1952,1961	154,9	277,9	1161
H_60	15/11/2012	Vranckx	1975-1978	87,5	169,7	1868
H_61	15/11/2012	Jean Gilot, *URBAREX*	1976	158,4	233,5	836
H_62	29/11/2012	Jan De Schrijver	1974	218,5	495,5	1247
H_63	29/11/2012	Jacques Rouvez, *Groupe Arco*	1960	97,7	192,5	891
H_64	01/12/2012	architectenbureau De Poorter	1983	124,8	261,6	1817
H_65	01/12/2012	A. Knap	1979-1982	191,8	337,7	1542

Appendix 4. Bibliography

Adorno, Theodor, *Aesthetische Theorie* (Frankfurt am Main: Suhrkamp, 1970).

Adriaenssens, Stef, and Jef Hendrickx, "Choices in Threefold. Home maintenance and improvement between household production, informal outsourcing and the formal economy", (Brussels: Hogeschool-Universiteit Brussel, Faculteit Economie en Management, 2008).

Agentschap Wonen Vlaanderen, "Debatnota Woonbeleidsplan Vlaanderen", (James Van Casteren, afdelingshoofd Woonbeleid, 2011) <https://www.wonenvlaanderen.be/uploads/documentenbank/e32dff72cc4f83777aa3a066648b1561.pdf?ht=1> [Accessed 06 June 2013].

Aibar, Eduardo, and Wiebe E Bijker, "Constructing a city: The Cerdà plan for the extension of Barcelona," *Science, technology & human values* 22, no. 1 (1997): 3-30.

Albrechts, Louis, and Griet Lievois, "The Flemish diamond: urban network in the making?," *European Planning Studies* 12, no. 3 (2004): 351-370.

Allacker, Karen, "Sustainable Building: The Development of an Evaluation Method" (unpublished doctoral dissertation, KU Leuven, 2010).

Allen, Stan, "Artificial Ecology," *Assemblage* 1997, no. 34 (1997): 107-109.

American Institute of Architects Knowledge Resources Staff, *AIA Research Primer* (Washington, DC: American Institute of Architects, 2009) <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab081880.pdf > [Accessed 07 November 2012].

Antrop, Marc, "Landscape change and the urbanization process in Europe," *Landscape and urban planning* 67, no. 1 (2004): 9-26.

Archer, Bruce, "The Nature of Research," *Co-design, interdisciplinary journal of design*, no. January (1995): 6-13.

Architecture Workroom Brussels, *Naar een visionaire woningbouw. Kansen en opgaven voor een trendbreuk in de Vlaamse woonproductie.* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2012).

Arets, Wiel, Pier Vittorio Aureli, Alexander d'Hooghe, and Roemer van Toorn, "The Properties of Projective Research," *Hunch*, no. 6/7 (2003): 526-527.

Argan, Giulio Carlo, "On the Typology of Architecture," in *Theorizing a New Agenda for Architecture: An anthology of architectural theory 1965-1995*, ed. by Kate Nesbitt (New York: Princeton Architectural Press, 1996): 240-246.

Atman, Cynthia, Justin Chimka, Karen Bursic, and Heather Nachtmann, "A comparison of freshman and senior engineering design processes," *Design Studies* 20, no. 2 (1999): 131-152.

Australian Institute of Architects, *Understanding Research Excellence in Architecture* (Australian Institute of Architects, National Education Committee, 2009) <http://www.architecture.com.au/policy/media/Understanding%20Research%20Excellence%20in%20Architecture.pdf > [Accessed 07 November 2012].

Banham, Reyner, *Los Angeles: The Architecture of Four Ecologies* (London: Allen Lane, 1971).

Bartiaux, Françoise, Guy Vekemans, Kirsten Gram-Hanssen, Dries Maes, Madeleine Cantaert, Benoît Spies, and Johan Desmedt, "Socio-technical factors influencing Residential Energy Consumption", (Brussels: Belgian Science Policy, 2005).

Basta, Claudia, and Stefano Moroni, eds., *Ethics, Design and Planning of the Built Environment* (Dordrecht: Springer, 2013).

Beetz, Stephan, Sandra Huning, and Tobias Plieninger, "Landscapes of Peripherization in North-eastern Germany's Countryside: New Challenges for Planning Theory and Practice," *International Planning Studies* 13, no. 4 (2008): 295-310.

Bekaert, Geert, "Het einde van de architectuur," in *1951-1991. Een tijdsbeeld* (Brussels: Paleis voor de Schone Kunsten, 1991): 197-207.

Bekaert, Geert, and Francis Strauven, *Bouwen in België 1945-1970* (Brussels: Nationale Confederatie van het Bouwbedrijf, 1971).

Bengtsson, Bo, and Hannu Ruonavaara, "Introduction to the Special Issue: Path Dependence in Housing," *Housing, Theory and Society* 27, no. 3 (2010): 193-203.

Berke, Philip R., "Does Sustainable Development Offer a New Direction for Planning? Challenges for the Twenty-First Century," *Journal of Planning Literature* 17, no. 1 (2002): 21-36.

Bervoets, Wouter, and Hilde Heynen, "The obduracy of the detached single family house in Flanders," *International Journal of Housing Policy* 13, no. 4 (2013): 358-380.

Bervoets, Wouter, and Marijn van de Weijer, "Paradoxen van landelijk wonen in Vlaanderen," *Agora* 28, no. 1 (2012): 34-38.

Bervoets, Wouter, Marijn van de Weijer, Dominique Vanneste, Lieve Vanderstraeten, Michael Ryckewaert, and Hilde Heynen, "Towards a sustainable transformation of the detached houses in peri-urban Flanders, Belgium," *the Journal of Urbanism: International Research on Placemaking and Urban Sustainability* (forthcoming).

Biggs, Michael A. R., and Daniela Büchler, "Architectural Practice and Academic Research," *Nordic Journal of Architectural Research* 20, no. 1 (2008): 83-94 (87).

Biggs, Michael A. R., and Daniela Büchler, "Rigor and Practice-based Research," *Design Issues* 23, no. 3 (2007): 62-69.

Bijker, Wiebe E, *Of Bicycles, Bakelites and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge: the MIT Press, 1995).

Blumer, Herbert, *Symbolic interactionism: Perspective and method* (Englewood Cliffs: Prentice Hall, Inc., 1969).

Boeijenga, Jelte, Jeroen Mensink, and Joost Grootens, *Vinex Atlas* (Rotterdam: 010 Publishers 2008).

Boeri, Stefano, "The Diffuse City," *Archis* 1999, no. 7, July (1999): 20-21.

Bokern, Anneke, "Parasitic architecture," *Topos: European landscape magazine* 42, no. March (2003): 52-57.

Börjeson, Lena, Mattias Höjer, Karl-Henrik Dreborg, Tomas Ekvall, and Göran Finnveden, "Scenario types and techniques: towards a user's guide," *Futures* 38, no. 7 (2006): 723-739.

Bormans, Frouwke, Bert Van de Vijver, Grete Gysen, and Hilde Van Ransbeke, "Woningopsplitsing: Richtlijnen voor de kwalitatieve opsplitsing van woningen in meerdere wooneenheden", ed. by vzw Stebo (Hasselt: Provincie Limburg, 2011).

Bowen, Simon John, "A Critical Artefact Methodology: Using Provocative Conceptual Designs to Foster Human-centred Innovation" (PhD thesis, Sheffield Hallam University, 2009).

Braem, Renaat, *Het lelijkste land ter wereld* (Leuven: Davidsfonds, 1968).

Brand, Stewart, *How Buildings Learn* (London: Penguin Books, 1994).

Buchanan, Richard, "Wicked Problems in Design Thinking," *Design Issues* 8, no. 2 (1992): 5-21.

Burton, Elizabeth, "The Compact City: Just or Just Compact? A Preliminary Analysis," *Urban Studies* 37, no. 11 (2000): 1969-2001.

Cahill, Caitlin, "Including excluded perspectives in participatory action research," *Design Studies* 28, no. 3 (2007): 325-340.

Caniggia, Gianfranco, and Gian Luigi Maffei, *Interpreting basic building: architectural composition and building typology* (Firenze: ALINEA Editrice, 2001).

Carmel-Gilfilen, Candy, and Margaret Portillo, "Where what's in common mediates disciplinary diversity in design students: A shared pathway of intellectual development," *Design Studies* 33, no. 3 (2012): 237-261.

Castex, Jean, Phillipe Panerai, Jean-Charles Depaule, and Ivor Samuels, *Urban Forms: the Death and Life of the Urban Block* (Oxford, Auckland, Boston, Johannesburg, Melbourne, New Delhi: Architectural Press, 2004).

Cataldi, Giancarlo, Gian Luigi Maffei, and Paolo Vaccaro, "Saverio Muratori and the Italian school of planning typology," *Urban Morphology* 6, no. 1 (2002): 3-14.

CBS, PBL, and Wageningen UR, "Veranderingen bodemgebruik, 1979 – 2008 (indicator 0060, versie 08, 9 december 2011)", CBS, Planbureau voor de Leefomgeving, Wageningen UR, (2011) <http://www.compendiumvoordeleefomgeving.nl/indicatoren/nl0060-Bodemgebruik-in-Nederland.html?i=15-18> [Accessed 13 August 2013].

Chapman, Nancy J., and Deborah A. Howe, "Accessory Apartments: Are they a realistic Alternative for Ageing in Place?," *Housing Studies* 16, no. 5 (2001): 637-650.

Clark, William A.V., and Marinus C. Deurloo, "Aging in Place and Housing Over-consumption," *Journal of Housing and the Built Environment* 21, no. 3 (2006).

Clingermayer, James C., "Heresthetics and happenstance: Intentional and unintentional exclusionary impacts of the zoning decision-making process," *Urban Studies* 41, no. 2 (2004): 377-388.

Cneut, Christophe, Rik Houthaeve, Sunay Durgun, Piet De Rycke, Pascal De Decker, Maarten Loopmans, Bart Claessens, Sven De Bevere, Xaveer De Geyter, David Schmitz, Yannis Igodt, and Dominique Vanneste, *(Her)gebruik van de Bestaande Woningvoorraad in de Klassieke Woonwijken uit de Jaren 1960 - 1980* (Brussels: Vlaamse overheid, departement RWO, 2009).

Coopmans, Femke, and Wolfgang Verraes, *Kangoeroewonen: een mens- en budgetvriendelijk woonidee* (De Pinte: Wolfgang Verraes, 2005).

Cross, Nigel, "Creative Cognition in Design I: The Creative Leap," in *Designerly Ways of Knowing*, ed. by Nigel Cross (London: Springer-Verlag, 2006): 43-61.

Cross, Nigel, "Designerly Ways of Knowing," *Design Studies* 3, no. 4 (1982): 221-227.

Cross, Nigel, *Designerly Ways of Knowing* (London: Springer-Verlag, 2006).

Cross, Nigel, "Designerly Ways of Knowing: Design Discipline versus Design Science," *Design Issues* 17, no. 3, summer (2001): 49-55.

Cross, Nigel, "Editorial," *Design Studies* 16, no. 1 (1995): 2-3.

Cross, Nigel, "Expertise in design: an overview," *Design Studies* 25, no. 5 (2004): 427-441.

Daniels, Eline, "Sleutelen aan het landelijke woonideaal in Vlaanderen" (unpublished Master thesis, KU Leuven, 2013).

Darin, Michael, "The study of urban form in France," *Urban Morphology* 2, no. 2 (1998): 63-76.

Darke, Jane, "The Primary Generator and the Design Process," *Design Studies* 1, no. 1 (1979): 36-44.

De Block, Greet, and Janet Polasky, "Light railways and the rural–urban continuum: technology, space and society in late nineteenth-century Belgium," *Journal of Historical Geography* 37, no. 3 (2011): 312-328.

De Caigny, Sofie, "Catholicism and the Domestic Sphere: Working-Class Women in Inter-War Flanders," *Home Cultures* 2, no. 1 (2005): 1-24.

De Decker, Pascal, "Understanding housing sprawl: the case of Flanders, Belgium," *Environment and Planning A* 43, no. 7 (2011): 1634-1654.

De Decker, Pascal, Michael Ryckewaert, Brecht Vandekerckhove, Ann Pisman, Frank Vastmans, and Marie Le Roy, *Ruimte voor Wonen, Trends en Uitdagingen* (Antwerpen: Garant, 2010).

De Geyter, Xaveer, Geert Bekaert, and Lieven De Boeck, *After-Sprawl. Research for the Contemporary City* (Rotterdam/ Antwerpen: NAi Publishers/ De Singel, 2002).

De Meulder, Bruno, "De Belgische Stedenbouw en de Behoefte van Welvaart 1945-1975. 10 Punten Over de Veranderende Productie van het Wonen," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam/ Antwerpen: 010/ Vai/ CVAa, 2006): 128-145.

De Meulder, Bruno, "Lintbebouwing: algemeen én Belgisch," *Stedebouw & Ruimtelijke Ordening* 86, no. 4 (2005): 40-43.

De Meulder, Bruno, "Old Dispersions and scenes for the Production of Public Space: The Constructive Margins of Secondarity," *Architectural Design* 78, no. 1 (2008): 28-33.

De Meulder, Bruno, Jan Schreurs, Annabel Cock, and Bruno Notteboom, "Patching up the Belgian Urban Landscape," *OASE* no. 52, Consumption and Territory (1999): 78-113.

De Meulder, Bruno, and Tania Vandenbroucke, "The Lys-Scheldt Interfluvium: Theatre of Do-It-Yourself," *OASE* no. 63, The Countryside (2004): 110-139.

De Pauw, Lukas, "Deconstructie van een Orde," in *Luc Deleu and TOP Office, 1967-1991*, ed. by Lilian Dewachter (Antwerp: MUHKA, 1991): 99-106.

De Vos, Els, and Hilde Heynen, "Shaping Popular Taste. The Belgian Farmers' Association and the Fermette During the 1960s and 1970s," *Home Cultures* 04, no. 03 (2007): 237-259.

De Vos, Els, and Hilde Heynen, "Uncanny and In-Between: The Garage in Rural and Suburban Belgian Flanders," *Technology and Culture* 52, no. 4 (2011): 757-787.

Declerck, Joachim, Michael Ryckewaert, and Stefan Devoldere, eds., *Pilootproject Wonen, Nieuwe vormen van collectiviteit* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013).

Deleu, Luc, *manifest aan de Orde* (Antwerp: Uitgeverij Guy Schraenen, 1983).

Deleu, Luc, "manifest aan de Orde," in *Postfuturismus?*, ed. by Luc Deleu (Wommelgem: Den Gulden Engel, 1987): 73-76.

Denis, Jacques, *Geografie van België*. ed. by Jacques Denis (Brussel: Brussel : Gemeentekrediet, 1992, 1992).

Devisch, Oswald, "Research-by-Design and the Renaissance of the Scenario-Method: A design-studio scenario-experiment on the restructuring of ribbon developments in Flanders", in *Planning for Resilient Cities and Regions, AESOP - ACSP Joint Congress* (Dublin, 2013): 1-11.

Devoldere, Stefan, "Een aangepast woonkader," in *Radicale Gemeenplaatsen. Europese architectuur uit Vlaanderen. Architectuurboek Vlaanderen N°10*, ed. by Ilse Degerickx, Aglaée Degros, Maarten Delbeke, Stefan Devoldere, Christoph Grafe, Elke Hoornaert, Christian Kieckens, André Loeckx, Dirk Somers, Axel Sowa and Ellis Woodman (Antwerp: VAi, 2012): 162-175.

Dogan, Femi, and Nancy J. Nersessian, "Conceptual diagrams in creative architectural practice: the case of Daniel Libeskind's Jewish Museum," *Arq - Architectural Research Quarterly* 16, no. 1 (2012): 14-27.

Dogan, Femi, and Nancy J. Nersessian, "Generic abstraction in design creativity: the case of Staatsgalerie by James Stirling," *Design Studies* 31, no. 3 (2010): 207-236.

Dorst, Kees, and Nigel Cross, "Creativity in the design process: co-evolution of problem-solution," *Design Studies* 22, no. 5 (2001): 425-437.

Doucet, Isabelle, and Kenny Cupers, "Agency in Architecture: Reframing Criticality in Theory and Practice," *Footprint*, no. 4 (2009): 1-6.

Douglas, James, *Building Adaptation, Second Edition* (Oxford: Butterworth-Heinemann, 2006).

Downton, Peter, *Design Research* (Melbourne: RMIT University Press 2003).

Droege, Peter, "Beyond Sustainability: Architecture in the Renewable City," in *The SAGE Handbook of Architectural Theory*, ed. by C Greig Crysler, Stephen Cairns and Hilde Heynen (London: Sage, 2012): 590-601.

Dunin-Woyseth, Halina, and Fredrik Nilsson, "Building (Trans)Disciplinary Architectural Research - Introducing Mode 1 and Mode 2 to Design Practitioners," in *Transdisciplinary Knowledge Production in Architecture and Urbanism*, ed. by Nel Janssens and Isabelle Doucet (Dordrecht: Springer, 2011): 79-96.

Durling, David "Discourses on research and the PhD in Design," *Quality Assurance in Education* 10, no. 2 (2002): 79-85.

Elkington, John, *Cannibals with forks : the triple bottom line of 21st century business* (Oxford: Capstone, 1998).

Erickson, Mary Ann, John Krout, Heidi Ewen, and Julie Robison, "Should I Stay or Should I Go? Moving Plans of Older Adults," *Journal of Housing for the Elderly* 20, no. 3 (2006): 5-22.

European Association for Architectural Education (EAAE), *Charter for Architectural Research, A Declaration and a Framework on Architectural Research* (Chania: European Association for Architectural Education (EAAE) Research Committee, 2012) <http://www.eaae.be/web_data/documents/research/120903EAAECharterArchitecturalResearch.pdf > [Accessed 07 November 2012].

European Parliament, and European Council, "Directive 2002/91/91EC of the European Parliament and the Council of 16 December 2002", (Brussels: European Union, 2002).

Faludi, Andreas, "The Netherlands: A culture with a soft spot for planning," in *Comparative planning cultures*, ed. by Bishwapriya Sanyal (London: Routledge, 2005): 285-307.

Feenberg, Andrew, "From Essentialism to Constructivism: Philosophy of Technology at the Crossroads," in *Technology and the Good Life?*, ed. by Eric Higgs, Andrew Light and David Strong (Chicago: the University of Chicago Press, 2000): 294-315.

Feist, Wolfgang, Jürgen Schnieders, Viktor Dorer, and Anne Haas, "Re-inventing air heating: Convenient and comfortable within the frame of the Passive House concept," *Energy and Buildings* 37, no. 11 (2005): 1186-1203.

Fishman, Robert, *Bourgeois utopias: The rise and fall of suburbia* (New York: Basic Books, 1987).

Fishman, Robert, *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright and Le Corbusier* (Cambridge: The MIT Press, 1982).

Floré, Fredie, "Lessons in modern living: home design exhibitions in Belgium 1945–1958," *The Journal of Architecture* 9, no. 4 (2004): 445-462.

Flyvbjerg, Bent, "Five misunderstandings about case-study research," *Qualitative inquiry* 12, no. 2 (2006): 219-245.

Fort, Francine, Michel Jacques, Rem Koolhaas, Stefano Boeri, Sanford Kwinter, Daniela Fabricius, Nadia Tazi, and Hans-Ulrich Obrist, eds., *Mutations* (Bordeaux, Barcelona: arc en rêve centre d'architecture, ACTAR, 2000).

Forty, Adrian, *Words and Buildings, A Vocabulary of Modern Architecture* (London: Thames & Hudson, 2000).

Frayling, Christopher, "Research in art and design", (London: Royal College of Art, 1993).

Friedman, Avi, *Planning the New Suburbia; Flexibility by Design* (Vancouver: UBC Press, 2002).

Friedman, Ken, "Research into, by and for Design," *Journal of Visual Arts Practice* 7, no. 2 (2008): 153-160.

Frumkin, Howard, "Urban sprawl and public health," *Public health reports* 117, no. 3 (2002): 201-217.

Garud, Raghu, Arun Kumaraswamy, and Peter Karnøe, "Path Dependence or Path Creation?," *Journal of Management Studies* 47, no. 4 (2010): 760-774.

Geels, Frank W, and Johan Schot, "Comment on 'Techno therapy or nurtured niches?'by Hommels et al.[Res. Policy 36 (7)(2007)]," *Research Policy* 36, no. 7 (2007): 1100-1101.

Geels, Frank W., "Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study," *Research Policy* 31, no. 8 (2002): 1257-1274.

Geels, Frank W., and Johan Schot, "Typology of sociotechnical transition pathways," *Research Policy* 36, no. 3 (2007): 399-417.

Gewertz, Ken, 'GSD's Koolhaas heads 'Project on the City'', *The Harvard University Gazette*, June 6 1996.

Gibbons, Michael, Camille Limoges, Helga Nowotny, Simon Schwartzmann, Peter Scott, and Martin Trow, *The New Production of Knowledge, The Dynamics of Science and Research in Contemporary Societies* (London: Sage Publications, 1994, repr 2002).

Glaser, Barney G., and Anselm L. Strauss, *The Discovery of Grounded Theory, Strategies for Qualitative Research*. ed. by Howard S. Becker, *Observations* (Chicago: Aldine Publishing Company, 1967).

Goel, Vinod, *Sketches of thought*. ed. by Vinod Goel, *Bradford Books* (Cambridge: MIT Press, 1995).

Goldschmidt, Gabriela, and Dan Tatsa, "How good are good ideas? Correlates of design creativity," *Design Studies* 26, no. 6 (2005): 593-611.

Goossens, Luc, Isabelle Thomas, and Dominique Vanneste, *Huisvesting in socio-economisch en demografisch perspectief 1981-1991* (Brussels: Ministerie van Economische Zaken, Nationaal Instituut voor de Statistiek, Federale Diensten voor wetenschappelijke, Technische en Culturele Aangelegenheden, 1999).

Gorman, Michael E., and W. Bernard Carlson, "Interpreting Invention as a Cognitive Process: The Case of Alexander Graham Bell, Thomas Edison, and the Telephone," *Science, Technology & Human Values* 15, no. 2 (1990): 131-164.

Gregory, S.A., "Design and the Design Method," in *The Design Method*, ed. by S.A. Gregory (London: Butterworths, 1966): 3-10.

Groat, Linda, and David Wang, *Architectural research methods* (New York: John Wiley & Sons, 2002).

Guest, Greg, Arwen Bunce, and Laura Johnson, "How many interviews are enough? An experiment with data saturation and variability," *Field methods* 18, no. 1 (2006): 59-82.

Hanson, Julienne, *Decoding Homes and Houses* (Cambridge: Cambridge University Press, 1998).

Hare, Patrick H., and Jolene N. Ostler, *Creating an Accessory Apartment* (New York: McGraw-Hill, 1987).

Harvey, David, "The Insurgent Architect at Work," in *Readings in the Philosophy of Technology*, ed. by David M. Kaplan (Lanham: Rowman & Littlefield Publishers, inc., 2004): 337-353.

Haughton, Graham, "Developing sustainable urban development models," *Cities* 14, no. 4 (1997): 189-195.

Hayden, Dolores, *Redesigning the American dream : the future of housing, work, and family life* (New York: Norton, 1984).

Hens, Hugo, Griet Verbeeck, and B Verdonck, "Impact of energy efficiency measures on the CO2 emissions in the residential sector, a large scale analysis," *Energy and Buildings* 33, no. 3 (2001): 275-281.

Heynen, Hilde, *Architecture and modernity: a critique* (Cambridge: MIT Press, 1999).

Heynen, Hilde, "Belgium and the Netherlands: two different ways of coping with the housing crisis, 1945-1970," *Home Cultures* 7, no. 2 (2010): 159-178.

Heynen, Hilde, "Fragmentatie in de periferie: De 'tapijtmetropool' van Willem-Jan Neutelings," *Archis* 1990, no. 3 (1990): 16-21.

Heynen, Hilde, "Unthinkable Doctorates? Introduction," *The Journal of Architecture* 11, no. 3 (2006): 277-282.

Heynen, Hilde, Michael Ryckewaert, Dominique Vanneste, and Koenraad Van Cleempoel, " Large dwellings in Flanders. Development of architectural and users strategies in view of demographic trends and ecological constraints. (Onderbezette grote woningen in Vlaanderen. Een onderzoek naar architecturale en gebruiksstrategieën in het licht van demografische bewegingen en ecologische beperkingen.)", Project application, Research Foundation Flanders (FWO), (2009).

Hill, Jonathan, "Drawing Research," *The Journal of Architecture* 11, no. 3 (2006): 329-333.

Hillier, Bill, "Space is the machine: a configurational theory of architecture", (London: Space Syntax, 2007).

Hinson, David, "Design as Research, learning from doing in the Design-Build studio," *Journal of Architectural Education* 61, no. 1 (2007): 23-26.

Holden, Erling, "Ecological footprints and sustainable urban form," *Journal of Housing and the Built Environment* 19, no. 1 (2004): 91-109.

Hommels, Anique, "Studying Obduracy in the City: Towards a Productive Fusion between Technology Studies and Urban Studies," *Science, Technology, & Human Values* 30, no. 3 (2005): 323-351.

Hommels, Anique, *Unbuilding Cities: Obduracy in Urban Sociotechnical Change* (Cambridge: the MIT press, 2005).

Hommels, Anique, Peter Peters, and Wiebe E Bijker, "Techno therapy or nurtured niches? Technology studies and the evaluation of radical innovations," *Research Policy* 36, no. 7 (2007): 1088-1099.

Horváth, Imre, "A treatise on order in engineering design research," *Research in Engineering Design*, no. 15 (2004): 155-181.

Hughes, Thomas P., "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems*, ed. by Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch (Cambridge, London: The MIT Press, 1987): 51-82.

Iris Consulting, "Gemeentelijk Ruimtelijk Uitvoeringsplan De Reukens Aartselaar, Toelichtingsnota", municipality of Aartselaar, (2012) <www.aartselaar.be/content/114> [Accessed 18 November 2013].

Jenks, Mike, Elizabeth Burton, and Katie Williams, eds., *The Compact City: A Sustainable Urban Form?* (London: E & FN Spon, 1996).

Johnson, Michael P, "Environmental impacts of urban sprawl: a survey of the literature and proposed research agenda," *Environment and Planning A* 33, no. 4 (2001): 717-735.

K Architectures, "Parasites," *Arch plus* no. 133, September (1996): 24-27.

Kintrea, Keith, "Housing aspirations and obsolescence: understanding the relationship," *Journal of Housing and the Built Environment* 22, (2007): 321-338.

Koolhaas, Rem, and Bruce Mau, *S,M,L,XL* (Rotterdam: 010 Publishers, 1995).

Krokfors, Karin, "Co-Housing in the Making," *Built Environment* 38, no. 2 (2012): 309-314.

Lancksweerdt, Erick, "Naar een andere constructie van het algemeen belang," *Tijdschrift voor bestuurswetenschappen en publiekrecht*, no. 2 (2011): 103-105.

Lash, Scott, Antoine Picon, Kenny Cupers, Isabelle Doucet, and Margaret Crawford, "Agency and Architecture: How to be Critical?," *Footprint*, no. 4 Spring (2009): 7-20.

Lawson, Bryan, *How Designers Think* (London: Architectural press, 1980).

Leupen, Bernard, *Frame and generic space* (Rotterdam: 010 Publishers, 2006).

Loeckx, André, "De moeilijke kunst van het tweevoud. het ruimtelijk structuurplan Vlaanderen," *Archis*, no. 10 (1995): 48-53.

Loeckx, André, "Project and Design, Amending the Project Mode," in *Framing Urban Renewal in Flanders*, ed. by André Loeckx (Amsterdam: SUN Architecture Publishers, 2009): 18-29.

Loeckx, André, "Wonen uit de fabriek. De vele levens van de bungalows van Danilith-Delmulle," in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam, Antwerpen: 010/ Vai/ CVAa, 2006): 230-247.

Loeckx, André, and Kelly Shannon, "Qualifying Urban Space," in *Urban Trialogues, visions_projects_co-productions, Localising Agenda 21*, ed. by André Loeckx, Kelly Shannon, Rafael Tuts and Han Verschure (Nairobi: UN-HABITAT, PGCHS KU Leuven, 2004): 156-166.

Lofvers, Willemijn, and Marcel Musch, "The Countryside," *OASE* no. 63, The Countryside (2004): 2-13.

Loorbach, Derk, and Jan Rotmans, "The practice of transition management: Examples and lessons from four distinct cases," *Futures* 42, no. 3 (2010): 237-246.

Maas, Winy, Jacob van Rijs, and Richard Koek, *FARMAX: Excursions on Density* (Rotterdam: 010 Publishers, 1998, repr 2006).

Maaskant, Madeleine, "Interview with Marcel Smets, Flemish Government Architect (2005-2010)," *OASE*, no. 83, Commissioning Architecture (2010): 99-106.

McClure, Ursula Emery, "The Good, The Bad, and The Ugly: Use and Abuse of the Research Studio," *Journal of Architectural Education* 61, no. 1 (2007): 73-75.

Meeus, Bruno, and Pascal De Decker, "The dynamic of not moving in Flanders, Belgium," *Ruimte & Maatschappij* 4, no. 2 (2012): 1-24.

Menezes, Alexandre, and Bryan Lawson, "How designers perceive sketches," *Design Studies* 27, no. 5 (2006): 571-585.

Mottram, Judith, and Chris Rust, "The pedestal and the pendulum: fine art practice, research and doctorates," *Journal of Visual arts Practice* 7, no. 2 (2008): 133-151.

Mumford, Lewis, "The Future of the City, 1962-1963," in *Lewis Mumford: architecture as a home for man*, ed. by Jeanne m. Davern (New York: Architectural Record, The McGraw-Hill Companies, 1975): 103-144.

Municipality of Vorselaar, and IOK, "Gemeentelijk Ruimtelijk Uitvoeringsplan Kern Vorselaar", municipality of Vorselaar, (2014) <http://www.vorselaar.be/inhoud/rup-kernopenbaar-onderzoek> [Accessed 28 March 2014].

Naess, Petter, "Urban Planning and Sustainable Development," *European Planning Studies* 9, no. 4 (2001): 503-524.

Nersessian, Nancy J., "Abstraction via generic modeling in concept formation in science," *Mind & Society* 3, no. 1 (2002): 129-154.

Nersessian, Nancy J., *Creating scientific concepts* (Cambridge, MA: MIT press, 2008).

Nersessian, Nancy J., "Model-based reasoning in conceptual change," in *Model-based reasoning in scientific discovery*, ed. by l. Magnani, N. J. Nersessian and P. Thagard (New York: Kluwer Academic/Plenum Publishers, 1999): 5-22.

Neuman, Michael, "The Compact City Fallacy," *Journal of Planning Education and Research* 25, no. 11 (2005): 11-26.

Nichols, Jane, and Erin Adams, "The Flex-Nest: The Accessory Dwelling Unit as Adaptable Housing for the Life Span," *Interiors* 4, no. 1 (2013): 31-52.

Norman, Jonathan, Heather L MacLean, and Christopher A Kennedy, "Comparing high and low residential density: life-cycle analysis of energy use and greenhouse gas emissions," *Journal of Urban Planning and Development* 132, no. 1 (2006): 10-21.

Oswalt, Philipp, ed., *Shrinking Cities Volume 2, Interventions* (Ostfildern: Hatje Cantz, 2006).

Picon, Antoine, "Architecture, Science, Technology, and the Virtual Realm," in *Architecture and the Sciences: Exchanging Metaphors*, ed. by Antoine Picon and Alessandra Ponte (New York: Princeton Architectural Press, 2003): 292-313.

Pisman, Ann, Georges Allaert, and Piet Lombaerde, "Ideaal wonen vanuit het perspectief van de bewoner," *Ruimte & Maatschappij* 3, no. 2 (2011): 23-44.

Poelmans, Lien, and Anton Van Rompaey, "Detecting and modelling spatial patterns of urban sprawl in highly fragmented areas: A case study in the Flanders–Brussels region," *Landscape and urban planning* 93, no. 1 (2009): 10-19.

Polanyi, Michael, *The Tacit Dimension* (Gloucester: Peter Smith, 1983).

POSAD, "Flemish Metropolitan Dream" (2012) <http://www.posadlabs.com/flemish-metropolitan-dream/> [Accessed 07 March 2013].

Power, Anne, "Social Exclusion and Urban Sprawl: Is the rescue of cities possible?," *Regional Studies* 35, no. 8 (2001): 731-742.

Powers, Matthew, "Towards a Discipline-Dependent Scholarship," *Journal of Architectural Education* 61, no. 1 (2007): 15-18.

Provincie Vlaams-Brabant, "woningdelen.een volwaardig woonalternatief?", (Leuven: Provincie Vlaams-Brabant, 2010).

Risselada, Max, ed., *Raumplan Versus Plan Libre: Adolf Loos [and] Le Corbusier* (Rotterdam: 010 Publishers, 2008).

Rittel, Horst , and Melvin Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4, (1973): 155-169.

Rotmans, Jan, *Transitiemanagement; sleutel voor een duurzame samenleving* (Assen: Koninklijke Van Gorcum, 2003).

Rowe, Colin, *The Mathematics of the Ideal Villa and Other Essays* (Cambridge: MIT Press, 1982).

RSV, "Ruimtelijk Structuurplan Vlaanderen, Flanders spatial Structure Plan", ed. by Ministry of the Flemish Community MVG (Brussels, 1997): http://rsv.vlaanderen.be/nl/index.html, [Accessed 10-11-2011].

Rust, Chris, "Design Enquiry: Tacit knowledge and invention in science," *Design Issues* 20, no. 4 (2004): 76-85.

Rust, Chris, "Unstated contributions: how artistic inquiry can inform inter-disciplinary research," *International Journal of Design* 1, no. 3 (2007): 69-76.

Ryckewaert, Michael, *Building the Economic Backbone of the Belgian Welfare State: Infrastructure, planning and architecture 1945-1973* (Rotterdam: 010 Publishers, 2011).

Ryckewaert, Michael "The Minimal Rationality of Dwelling Patterns in Flanders' Nevelstad," *OASE* no. 60, Urbanism out of Town (2002): 49-60.

Ryckewaert, Michael, Pascal De Decker, Sien Winters, Brecht Vandekerckhove, Frank Vastmans, Marja Elsinga, and Kristof Heylen, *een woonmodel in transitie; Toekomstverkenning van het Vlaamse wonen* (Antwerpen: Garant, 2012).

Ryckewaert, Michael, and Katrien Theunis, "Het Lelijkste Land, de mythe voorbij," *Stadsgeschiedenis* 1, no. 2 (2006): 148-168.

Saint, Andrew, *Architect and Engineer: A Study in Sibling Rivalry* (New Haven: Yale University Press, 2007).

Salet, Willem, "The compact city from a national policy perspective: Institutional resistance or institutional reform?," in *Compact City Extended: Outline for future policy, research, and design*, ed. by Luuk Boelens, Henk Ovink, Hanna Lara Palsdottir and Elien Wierenga (Rotterdam: 010 Publishers, 2011): 54-71.

Salewski, Christian, *Dutch New Worlds: Scenarios in Physical Planning and Design in the Netherlands, 1970-2000* (Rotterdam: 010 Publishers, 2012).

Salomon, David, "Experimental cultures: on the "end" of the design thesis and the rise of the research studio," *Journal of Architectural Education* 65, no. 1 (2011): 33-44.

Sanoff, Henry, "Editorial, special issue on participatory design," *Design Studies* 28, no. 3 (2007): 213-215.

Schein, Edgar, *Professional Education* (New York: McGraw-Hill, 1973).

Schively, Carissa, "Understanding the NIMBY and LULU Phenomena: Reassessing our Knowledge Base and Informing Future Research," *Journal of Planning Literature* 21, no. 3 (2007): 255-266.

Schön, Donald A., *The Reflective Practitioner, How Professionals Think in Action* (Aldershot: Ashgate Publishing Limited, 1983).

Secchi, Bernardo, "Descriptive City Planning," *Casabella* 56, no. 588 (1992): 22-23, 61-62.

Secchi, Bernardo, "Diary of a planner: 6. Scenarios", Planum, (2004) <http://www.planum.net/topics/secchi-diary.html> [Accessed March 21 2013].

Secchi, Bernardo, "The Periphery," *Casabella* 55, no. 583 (1991): 20-22, 60.

Segal, Rafi, and Els Verbakel, "Introduction: Urbanism Without Density," *Architectural Design* 78, no. 1 (2008): 6-11.

Sels, Geert, ''Erfgoed is overgewaardeerd': architect Leo van Broeck, geneesheer van een ziek ruimtegebruik ', *De Standaard*, 04-05 May 2013, pp. c10-c12.

Shannon, Kelly, "Redesigning the Belgian Dream; Social housing in Belgium," *Archis* 1998, no. 8 (1998): 10-28.

Simon, Herbert, *The Sciences of the Artificial* (Cambridge, Ma: MIT Press, 1969).

Smets, Marcel, “Een tijd van Vanzelfsprekendheid,” in *1951-1991. Een tijdsbeeld* (Brussels: Paleis voor de Schone Kunsten, 1991): 189-195.

Strauven, Francis, “hoe belgië zijn aanblik kreeg: 150 jaar architectuur en stedebouw in belgië,” *Wonen TA/BK*, no. 12 (1980): 7-22.

Stuhlmacher, Mechtild, “Afterparty - Afterparasites,” *OASE* no. 67, After the Party (2005): 121-125.

Swinnen, Peter, Stefan Devoldere, Tania Hertveld, Joachim Declerck, Roeland Dudal, and Joeri De Bruyn, eds., *The Ambition of the Territory* (Brussels: Peter Swinnen, Vlaams Bouwmeester, 2013).

Takeda, Hideaki, Paul Veerkamp, Tomiyama Tetsuo, and Hiroyuki Yoshikawa, “Modeling Design Processes,” *AI Magazine* 11, no. 4 (1990): 37-48.

Team Ontwerpend Onderzoek, *Ontwerpend Onderzoek als Methodiek. Kandidatuur Vlaamse Planningsprijs 2012* (Antwerp: City of Antwerp, 2012).

Theunis, Kathrien, “De Wet De Taeye. De individuele woning als bouwsteen van de welvaartsstaat,” in *Wonen in Welvaart : Woningbouw en Wooncultuur in Vlaanderen 1948-1973*, ed. by Karina Van Herck and Tom Avermaete (Rotterdam, Antwerpen: 010/ Vai/ CVAa, 2006).

Theunis, Kathrien, “De zoektocht naar een Belgisch woonproject, 1965-1975: toenaderingen tussen ontwerpers en overheid in de praktijk van het private wonen / The quest for a Belgian housing project, 1965-1975: approaches between designers and authorities in the practice of private housing “, KU Leuven, 2008).

Thomas, Isabelle, Dominique Vanneste, and Xavier Quérriau, *Atlas de Belgique. Habitat/ Atlas van België. Wonen* (Ghent: Academia press, 2011).

Thomsen, André, and Kees van der Flier, “Replacement or renovation of dwellings: the relevance of a more sustainable approach,” *Building Research & Information* 37, no. 5-6 (2009): 649–659.

Till, Jeremy, *Architectural Research: Three Myths and One Model* (London: Royal Institute of British Architects (RIBA), 2008) <http://www.architecture.com/Files/RIBAProfessionalServices/ResearchAndDevelopment/WhatisArchitecturalResearch.pdf > [Accessed 07 November 2012].

Till, Jeremy, and Tatjana Schneider, “Flexible housing: opportunities and limits,” *Arq - Architectural Research Quarterly* 9, no. 2 (2005): 157-166.

Till, Jeremy, and Tatjana Schneider, “Flexible housing: the means to the end,” *arq - Architectural Research Quarterly* 9, no. 3/4 (2005): 287-296.

Timmermans, Jacques, "Voorstel van decreet van de heer J. Timmermans c.s. houdende wijziging van artikel 87 van de wet van 29 maart 1962 houdende organisatie van de ruimtelijke ordening en van de stedebouw", (Brussels: Vlaamse Raad stuk 568 (1993-1994) nr. 1, 1994).

Transitiearena Duurzaam Wonen en Bouwen, "Vlaanderen in de steigers: Visie op duurzaam wonen en bouwen in 2030 en actie voor nu" (2007) <http://www.duwobo.be/media/transitieagenda_2007.pdf> [Accessed 06 November 2013].

Triest, Peter, and Wiet Vandaele, "Verhaal zkt. vertellers," *Ruimte* 3, no. 11 (2011): 44-47.

Tyng, Alexandra, *Beginnings: Louis I. Kahn's Philosophy of Architecture* (New York: John Wiley & Sons, 1984).

Ungers, Oswald Mathias, P. Riemann, H. Kollhoff, A. Ovaska, and R. Koolhaas, "Die Stadt in der Stadt. Berlin das Grüne Stadtarchipel," *Lotus International* 19, (1978).

Uyttenhove, Pieter, "The Belgian back room," *Archis*, no. 2 (1997): 8-15.

Uyttenhove, Pieter, *Stadland België. Hoofdstukken uit de geschiedenis van de stedenbouw.* (Ghent: A&S Publishers, 2011).

Van Acker, Veronique, "Spatial and Social Variations in Travel Behaviour: Incorporating lifestyles and attitudes into travel-behaviour- land use interaction research" (PhD thesis, Ghent University, 2010).

van de Weijer, Marijn, and Oswald Devisch, "Towards an Ideal Scenario: Two attempts to integrate arts and science to address spatial issues", in *Proceedings of the Knowing (by) Designing Conference*, ed. by Johan Verbeke and Burak Pak (Brussels: LUCA, Sint-Lucas School of Architecture Ghent/Brussels, KU Leuven Faculty of Architecture, 2013): 300-311.

van de Weijer, Marijn, Koenraad Van Cleempoel, and Hilde Heynen, "Positioning Research and Design in Academia and Practice. a Contribution to a Continuing Debate," *Design Issues* 30, no. 02 (2014): 17-29.

Van den Bossche, Freya, "Wonen in Vlaanderen 2050: Krijtlijnen van een Toekomstvisie", Flemish Ministry for Energy, Housing, Cities and Social Economy, (2012) <https://www.wonenvlaanderen.be/uploads/documentenbank/c9dbbc8ee62092f878b48d895560a4cb.pdf?ht=1> [Accessed 06 June 2013].

Van Den Broeck, Jef, "In de Ban van Ruimte en Beleid: Relaas van een Zoektocht," *Ruimte & Planning* 25, no. 3-4 (2005): 12-34.

Van Der Hoeven, Frank, "Mind the evaluation gap: reviewing the assessment of architectural research in the Netherlands," *architectural research quarterly* 15, no. 2 (2011): 177-187.

van der Lugt, Remko, "How sketching can affect the idea generation process in design group meetings," *Design Studies* 26, no. 2 (2005): 101-122.

Van Hecke, Etienne, "Ruimtegebruik in Vlaanderen, studie uitgevoerd in opdracht van de Vlaamse Milieumaatschappij, MIRA", (Leuven: KU Leuven, 2003).

Van Herck, Karina, and Bruno De Meulder, eds., *Wonen in Meervoud. Groepswoningbouw in Vlaanderen 2000-2010* (Nijmegen: SUN, 2009).

van Oeffelt, Theo, Bernard Hulsman, Kees de Graaf, and Luuk Kramer, *Nieuw Nieuw-West: Stedelijke vernieuwing in de Amsterdamse tuinsteden 2000-2010* (Bussum: uitgeverij TOTH, 2010).

Vandenborne, Kimberley, "Alternative forms of inhabitation of post-war detached houses in Flanders/ Alternatieve vormen van bewoning van naoorlogse vrijstaande woningen in Vlaanderen" (unpublished Master thesis, KU Leuven, 2012).

Vandenbroeck, Philippe, "The Added-Value of Scenarios for Strategic Spatial Planning" (Master Thesis, KU Leuven 2011).

Vandenbroeck, Philippe, Annette Kuhk, Els Lievois, Jan Schreurs, and Frank Moulaert, "De toegevoegde waarde van scenario's voor het ruimtelijk beleid. Finaal deelrapport", (Heverlee: Steunpunt Ruimte en Wonen, 2011).

Vandevyvere, Han, "Strategieën voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen" (unpublished doctoral dissertation, KU Leuven, 2010).

Vandevyvere, Han, and Griet Verbeeck, "Duurzaam bouwen en wonen," in *Duurzame ontwikkeling: Een multidisciplinaire visie*, ed. by LONDO (Leuvens Onderzoeksnetwerk Duurzame Ontwikkeling) (Leuven: Uitgeverij Acco, 2009, repr 2013): 141-173.

Vanneste, Dominique, "Le logement et la différenciation sociale et résidentielle dans la ville pré-industrielle en Europe occidentale (XVIe-XVIIIe siècles)," *Espace, populations, sociétés* 4, no. 1 (1986): 125-136.

Vanneste, Dominique, "Rural economy and indigence in mid-nineteenth-century Belgium," *Journal of Historical Geography* 23, no. 1 (1997): 3-15.

Vanneste, Dominique, Isabelle Thomas, and Luc Goossens, "Woning en woonomgeving in België", (Brussels: FOD Economie, KMO, Middenstand en Energie, Algemene Directie Statistiek en Economische Informatie, 2007).

Vanneste, Dominique, Isabelle Thomas, and Lieve Vanderstraeten, "The spatial structure(s) of the Belgian housing stock," *Journal of Housing and the Built Environment* 23, no. 3 (2008): 173-198.

Vanneste, Dominique, Lieve Vanderstraeten, and Isabelle Thomas, "Appreciatie van de woonomgeving en woon-plaats in de stad: een trade-off?," in *Zo lang de leeuw kan bouwen: Liber Amicorum Prof. Dr. Luc Goossens*, ed. by Pascal De Decker, Bernard Hubeau, Ilse Loots and Isabelle Pannecoucke (Antwerp: Garant, 2012): 155-184.

Varnelis, Kazys, "Is there Research in the Studio?," *Journal of Architectural Education* 61, no. 1, September (2007): 11-14.

VEA (Flemish Energy Office), "Veelgemaakte fouten in EPB Aangiften", Vlaams ministerie van Leefmilieu, Natuur en Energie, (2010) <http://www2.vlaanderen.be/economie/energiesparen/epb/nb1004/annex2veelgemaaktefouten.pdf> [Accessed 31 October 2013].

VEA (Flemish Energy Office), "Vlaamse Regering principieel akkoord met E70 vanaf 2012", ed. by Flemish Government (Vlaamse Regering) (Brussels, 2010).

Venturi, Robert, Denise Scott Brown, and Steven Izenour, *Learning from Las Vegas: the forgotten symbolism of architectural form* (Cambridge: The MIT Press, 1972).

Verbeeck, Griet, "Optimisation of Extremely Low Energy Residential Buildings" (unpublished doctoral dissertation, KU Leuven, 2007).

Verbeeck, Griet, and Hugo Hens, "Energy savings in retrofitted dwellings: economically viable?," *Energy and Buildings* 37, no. 7 (2005): 747-754.

Verhetsel, Ann, Frank Witlox, and Nele Tierens, *Jongeren en Wonen in Vlaanderen. woonsituatie, woonwensen en woonbehoeften* (Antwerp: De Boeck, 2003).

Verheyen, Anne-Sofie, "Kavel per Kavel, Onderzoek naar duurzame alternatieven voor de klassieke verkaveling in Vlaanderen" (unpublished Master thesis, KU Leuven, 2012).

Vestbro, Dick Urban, and Liisa Horelli, "Design for gender Equality: The History of Co-Housing Ideas and Realities," *Built Environment* 38, no. 2 (2012): 315-335.

Vestergaard, Hedvig, "Single family detached housing-A branch of paradise or a problem," in *Home ownership. Getting in, getting from, getting out. Part II - Housing and Urban Policy studies 30*, ed. by John Doling and Marja Elsinga (Amsterdam: IOS Press, 2006): 75-91.

Vidler, Anthony, "Diagrams of diagrams: architectural abstraction and modern representation," *Representations*, no. 72 (2000): 1-20.

Viganò, Paola, "The Contemporary European Urban Project: Archipelago City, Diffuse City and Reverse City," in *The Sage Handbook of Architectural Theory*, ed. by C. Greig Crysler, Stephen Cairns and Hilde Heynen (London: Sage, 2012): 657-670.

Viganò, Paola, and Bernardo Secchi, "Some Reflections on Projects and Design," in *Strategic Spatial Projects, Catalysts for Change*, ed. by Stijn Oosterlynck, Jef Van den Broeck, Louis Albrechts, Frank Moulaert and Ann Verhetsel (London: Routledge, 2011): 154-160.

Vlaams Ministerie Ruimte Vlaanderen Woonbeleid en Onroerend Erfgoed, "Vlaamse Codex Ruimtelijke Ordening", (Brussels, 2009).

Vlaamse Overheid, "Groenboek Vlaanderen in 2050: mensenmaat in een metropool? Beleidsplan Ruimte Vlaanderen", (Brussels: Vlaamse Overheid, Departement RWO, 2012).

Vogels, Mieke, *Het nieuwe wonen. Vlaams woonbeleid op nieuwe sporen.* (Leuven: Lannoo Campus, 2012).

Weeber, Carel, *het Wilde Wonen* (Rotterdam: 010 Publishers, 1998).

Weisberg, Michael, "Three kinds of Idealization," *The Journal of Philosophy* 104, no. 12 (2007): 639-659.

Weisberg, Michael, "Who is a Modeler?," *the British journal for the philosophy of science* 58, no. 2 (2007): 207-233.

Wilkinson, Angela, and Esther Eidinow, "Evolving practices in environmental scenarios: a new scenario typology," *Environmental Research Letters* 3, no. 4 (2008): 1-11.

Williams, Katie, Elizabeth Burton, and Mike Jenks, "Achieving the Compact City through Intensification: *An Acceptable Option?*," in *The Compact City: A Sustainable Urban Form?*, ed. by Mike Jenks, Elizabeth Burton and Katie Williams (London: E & FN Spon, 1996): 83-96.

Williams, Katie, and Caroll Dair, "What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments," *Sustainable Development* 15, no. 3 (2007): 135-147.

Williams, Rosalind, *Notes on the Underground* (Cambridge, London: The MIT Press, 1990).

Wittkower, Rudolf, "Principles of Palladio's Architecture," *Journal of the Warburg and Courtauld Institutes* 7, (1944): 102-122.

Yin, Robert K., *Case Study Research: Design and Methods, Fourth Edition*, *Applied Social Research Methods Series* (London: Sage, 2009).

Younès, Chris, "Doctorates Caught Between Disciplines and Projects," *The Journal of Architecture* 11, no. 3 (2006): 315-322.

Zaera-Polo, Alejandro, "Patterns, Fabrics, Prototypes, Tessellations," *Architectural Design* 79, no. 6 (2009): 18-27.

Zonneveld, Wil, "In search of conceptual modernization: The new Dutch 'national spatial strategy'," *Journal of Housing and the Built Environment* 20, no. 4 (2005): 425-443.