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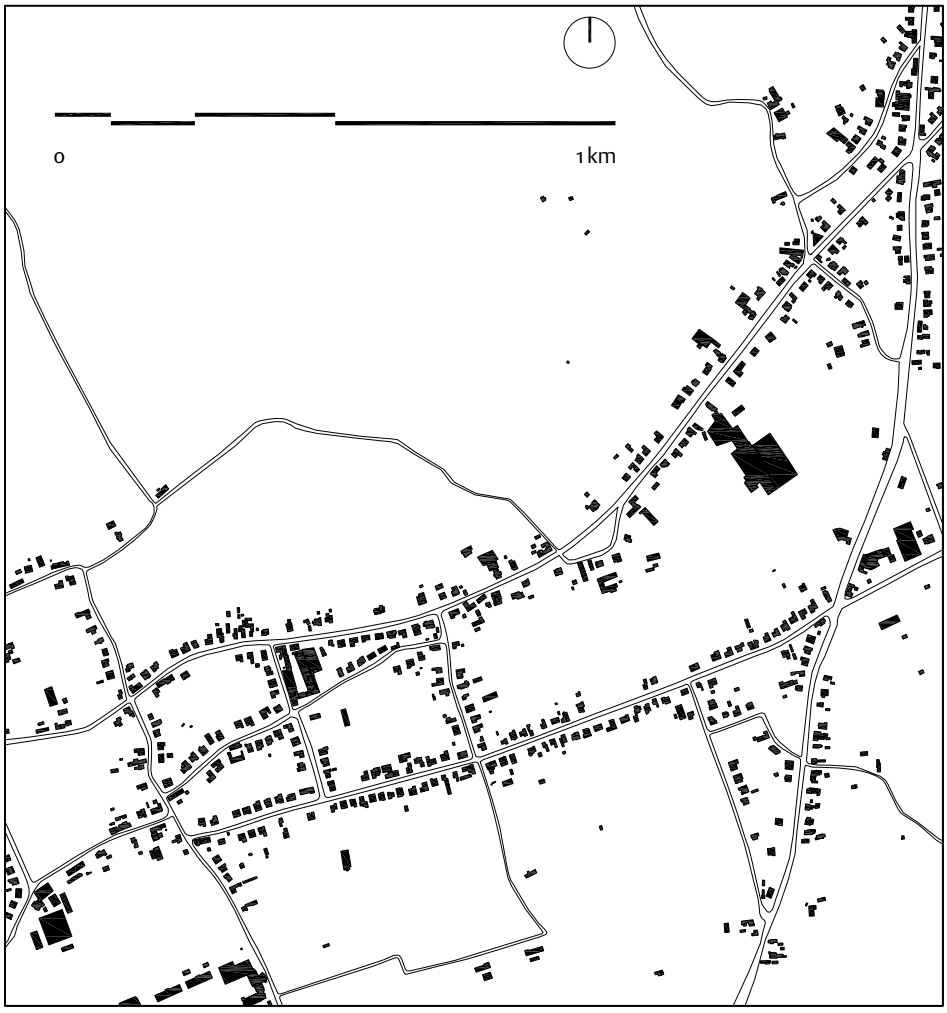

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1 A ribbon development in Lummen. Detached houses have been built all across Flanders, forging a widespread, peri-urban and quasi-rural residential landscape

2 Figure-ground (built form) of the ribbon development in Lummen: former agricultural hamlets have been connected to one another by gradual urbanisation, mainly consisting of detached houses

https://doi.org/10.1017/S1359135515000275 Published online by Cambridge University Press

arq (2015), **19.1**, 18–29. © Cambridge University Press 2015

In a design studio linked to a research project, students respond to a societal debate about intervening in typically Flemish suburban areas, composed of privately-owned detached dwellings.

New narratives for existing houses in Flanders, Belgium: Exploring the discourse on retrofitting dwellings

Marijn van de Weijer and Koenraad Van Cleempoel

The Belgian housing discourse contains strong disagreement about how to deal with the legacy of the postwar housing model and how to continue with housing production in response to shifting housing demands. An important aspect of this discussion is how to intervene in existing sprawling settlement patterns that have resulted from postwar building practice. This contribution discusses how this housing question has been the topic of a research project on postwar, detached single-family houses in Flanders, Belgium.[1] It focuses on how this issue was the focal point in a related design studio that was organised in the Faculty of Architecture and Arts at Hasselt University for master's students in Interior Architecture and Architecture. The design studio followed a rigorous methodology, devised to enquire to what extent detached houses are suitable for sharing or subdivision, hence catering to diverse inhabitation patterns resulting from population growth, ageing, and decreasing household sizes. This methodology was structured by a matrix, delimiting four housing types and three project briefs the participants could choose from, giving them twelve options. Students were directed to take a position and argue their stance *vis-à-vis* this problem by exploring the possibility of adapting such traditional dwellings, redesigning a house for inhabitation by two small households instead of one. Students were made aware of the contradictory arguments of supporters and opponents of such an approach of retrofitting. They were required to substantiate their design with their own exploratory arguments that resulted from a critical analysis based on the matrix. Moreover, their arguments were gathered as qualitative data, feeding back into the research project. Thus, this article outlines an approach of connecting design teaching to architectural research into a topical societal problem.

Research of Flemish houses feeds into the studio

In response to a current disparity between housing supply and demand, research was conducted by way of an interdisciplinary research project at KU Leuven and Hasselt University. Titled 'Large underused dwellings in Flanders', the project investigated the potential of diversification, densification, and landscape restructuring as interventions in existing low-density neighbourhoods.[2] The project considered the largest share of the housing stock: 36% of the houses in Flanders are detached dwellings,[3] which are characterised by relatively spacious layouts[4] and building lots that result in low-density neighbourhoods. These sprawling settlement patterns are inextricably bound up with problems such as the high level of automobile traffic (resulting in pollution and traffic congestion), loss of open land and ecological values, and an inflexible housing market. Attempts to implement further densification in poorly connected locations or to continue leapfrog development on greenfield land would prove detrimental.

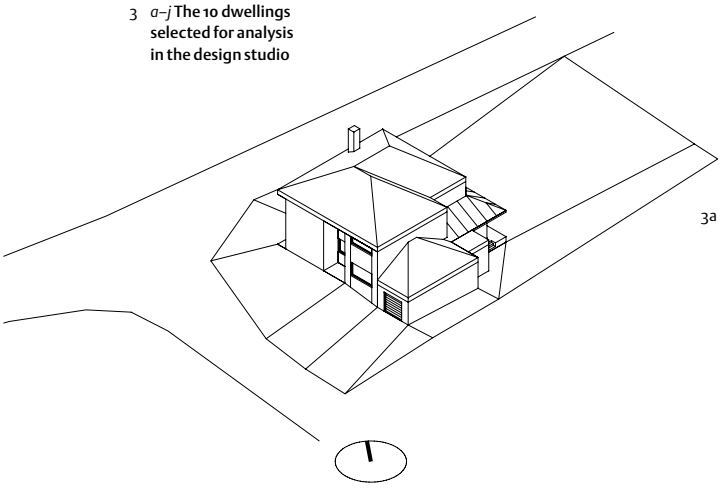
This research posed the central question of whether these oversized houses and neighbourhoods can be used more efficiently and sustainably *[1, 2]*. Retrofitting single houses, improving their technical performance, and even redesigning them for shared use reflects the traditional Flemish building practice, culturally determined by small-scale commissions and individual home ownership.[5] However, this project also scrutinised more intrusive strategies, such as demolition followed by replacement or landscape restructuring. The researchers engaged in qualitative research among inhabitants, designers and planners, resulting in the documentation of conditions for implementing such transformative strategies. The studio was organised as a projective enquiry, and provided the opportunity to add a complementary perspective to analyses of stakeholder testimonies and of conditions laid down in building regulations and zoning plans. For sharing a dwelling, documented conditions are a local pressure on the housing market and the option to respond to temporary housing demands, for example as a result of sudden health changes of elderly people.[6] These conditions require interventions in the built environment that are easy to implement and are reversible. Current building

doi: 10.1017/S1359135515000275

regulations and zoning plans do not provide a level of flexibility to take such conditions into account, and therefore exploring the potential of retrofitting in practice is difficult.[7] Within these parameters, the studio was organised to focus on strategies of housing subdivision, hence excluding more intrusive approaches from the design scope and matching the interest of participants studying both Interior Architecture and Architecture. The overarching research defined the structure and relevant parameters for the studio, which was organised as an arena for discussion and the collection of relevant arguments in words and in illustrated proposals.[8]

The studio itself took the form of a full-time, two-week design project. Forty master's students of Interior Architecture and of Architecture worked in groups of four, each group studying four of the ten case-study dwellings *[3]*.[9] Each group worked out a design for one selected dwelling, proposing a form of shared use. Although two weeks is a short time span for such a studio, this organisation fostered rapid decision-making. The main research project and its tentative findings provided a framework allowing for a quick start, as the fieldwork conducted by the authors as part of this research made a representative sample of ten detached houses available and accessible.[10] These houses were built between 1965 and 1982, and exemplify recurring residential typologies. During the process, the students became aware of contradictory professional viewpoints with regard to retrofitting and adapting houses, which also emerged from the authors' fieldwork and interviews. These viewpoints were presented by means of lectures and were represented by involved design tutors with practical design experience who advocated contradictory approaches toward reusing detached dwellings.[11] The mentors particularly emphasised two approaches: an approach of intervening in a minimal way to introduce a better form of use for an existing dwelling, and an approach to implement more radical interventions, redefining the basic typology of a dwelling and generating a new vision on how to reside in these built objects. The research 'Large underused dwellings in Flanders' has analysed such opposing viewpoints in relation to the open question of how to organise a feasible and sustainable transition in something as inert as the housing stock, strongly determined by local building culture and property structures. The novelty of this approach is that the participating students were not taught to address a societal problem from within one paradigm, which would be the case for a studio

3 *a–j* **The 10 dwellings selected for analysis in the design studio**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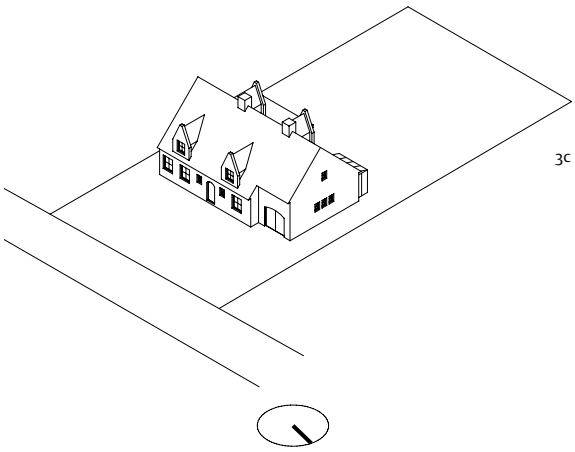
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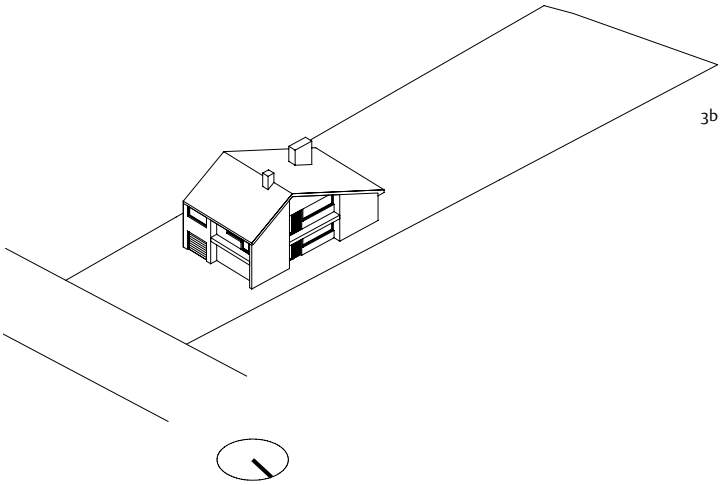
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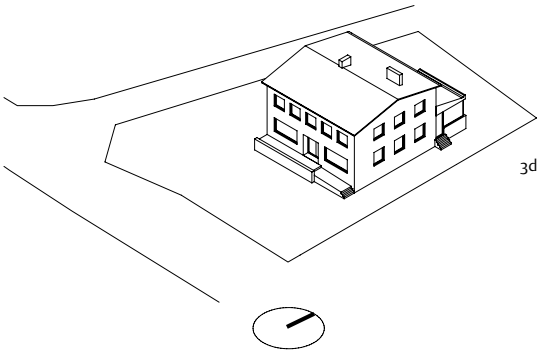
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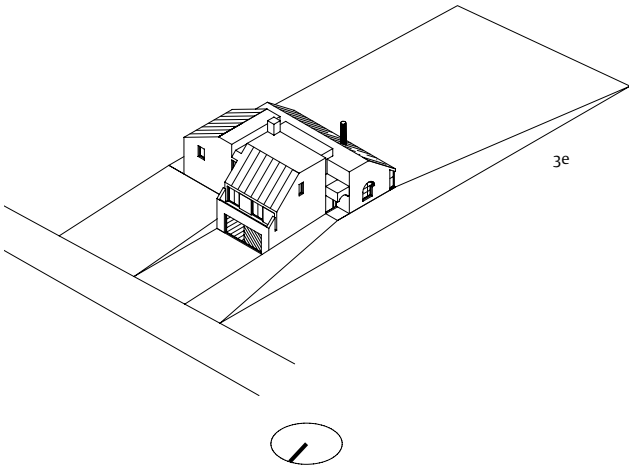

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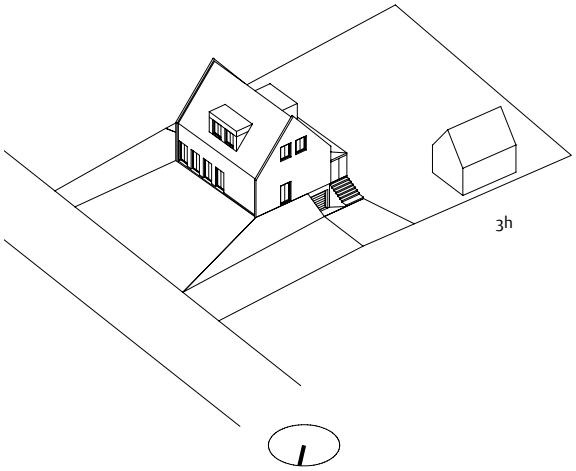

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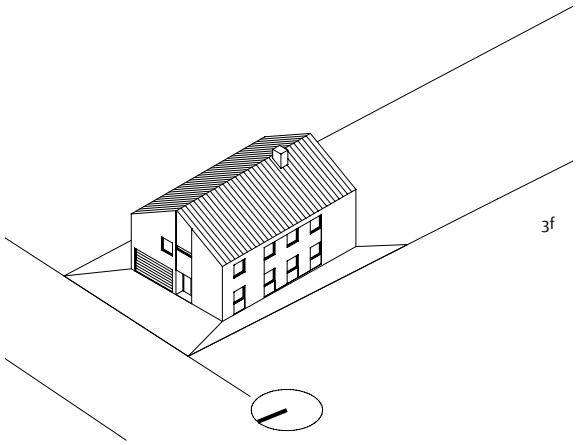

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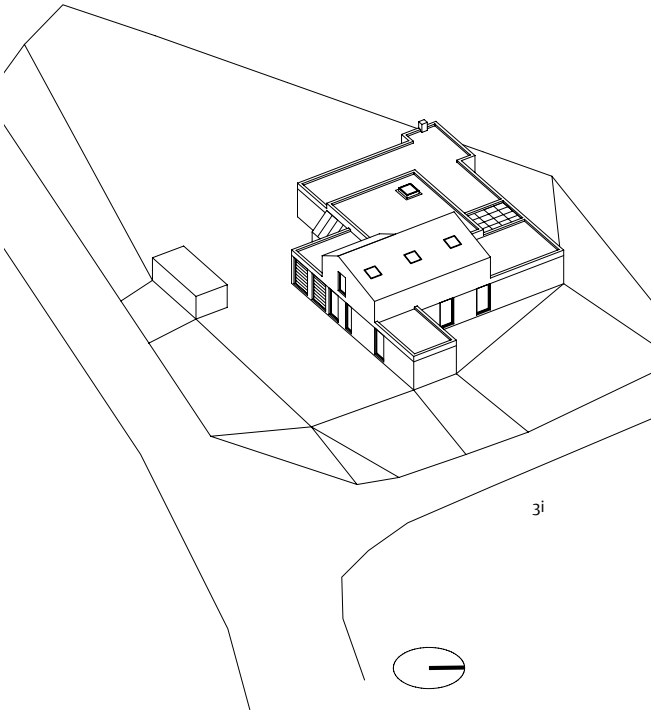

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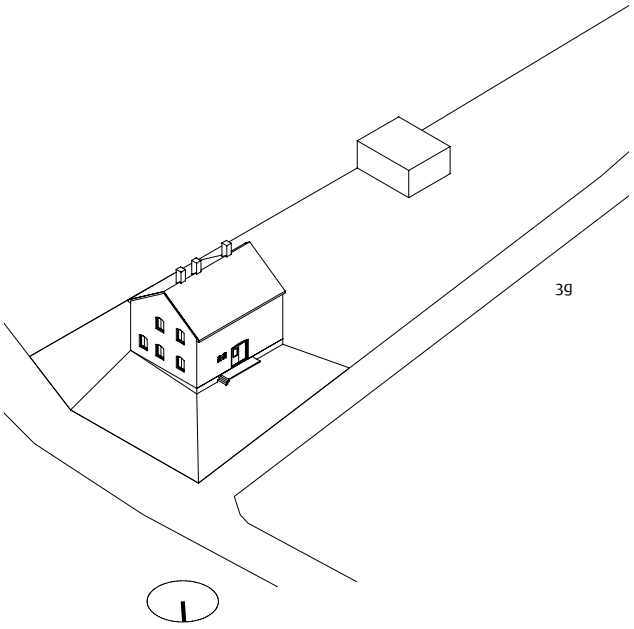

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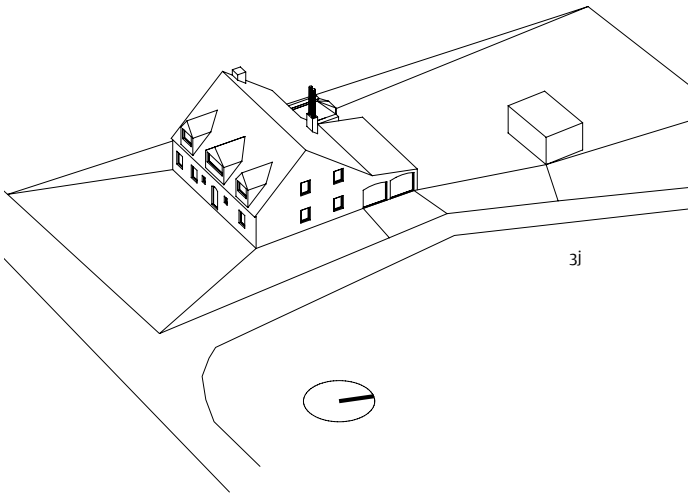

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organising the learning process along principles of apprenticeship. While apprenticeship is an effective method of mastering a profession,[12] this studio brought contemporary professional contradictions into the limelight and was an exercise in gathering and evaluating arguments for taking a proper position. Hence, participants formulated their own view on the matter of retrofitting and subdivision.

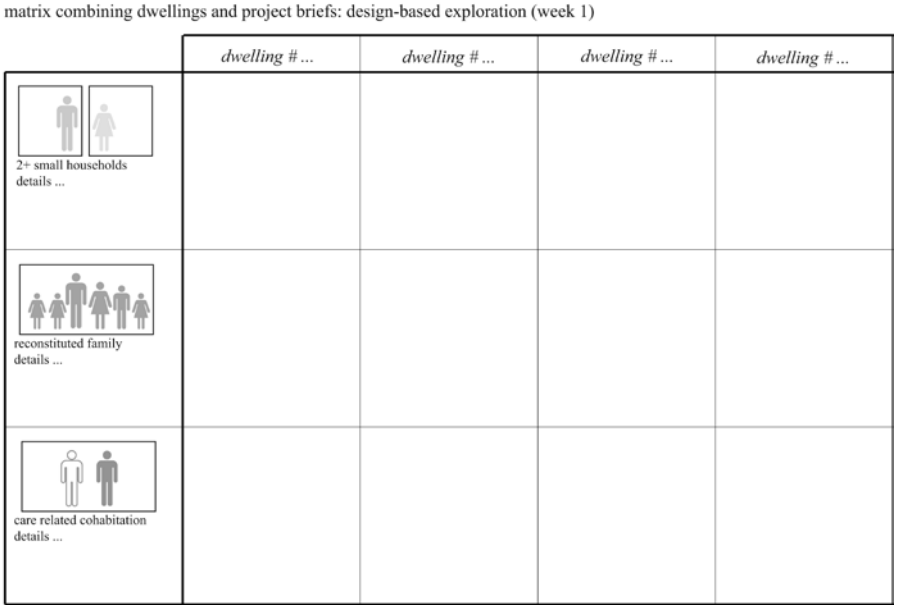
Ethical issues

However, the involvement of students in a research project is subject to criticism. David Salomon argues that the participants' first interest is to be taught about design.[13] Their personal development as designers should not be put at risk by the confines of a research project that is not theirs. Ursula Emery McClure warns against the abuse of students executing part of a research undertaking without receiving credit or payment for it, and who are working without clearly defined and fair grading criteria.[14] Another concern is the difference between the projective character of a design assignment and the critical perspective of a research project. In this particular case, the researchers critically enquired into subdivision of dwellings as a strategy for adapting the slowly developing housing stock to meet current housing demands. In this design studio, a student's critical analysis that led to the conclusion not to intervene in the given context would result in dissatisfaction with regard to the achieved objectives and a disappointing outcome for the participant. The design studio is a failure if it does not accomplish its other primary goal, which is the teaching of design skills. Here lies a conflict between the satisfactory results of research and those of design practice.

Therefore, to collect the decisive arguments of the involved participants, the studio was organised not only to deliver design projects, but equally to document design decisions and dwelling analysis. These arguments were treated as data for further analysis in the context of the research project. Chris Rust speaks of such design practice involved in research in terms of 'unstated contributions', as when an artist or designer produces an artistic or design product that facilitates enquiry by another party, a researcher.[15] Such an interdisciplinary cooperation allows a designer to produce a design on the basis of his or her own tacit 'knowing-in-action'.[16] The research scrutinises this process and how it leads to the product. Hence, the authors benefitted from the rich data and contextualisation that are typical of a design project. The involved participants are considered to have full authorship of their designs while their decisive arguments become a subject of analysis in this research, along with other forms of data resulting from qualitative research and architectural analysis. In this specific case, the students also benefitted from the interaction with ongoing research, as they became acquainted with the societal context and could prepare for their role as responsible professionals in society. Both parties operated with instruments suitable to their discipline, and they retain authorship over their contribution to the interdisciplinary cooperation.[17] Moreover, by offering the participants multiple options, the matrix prevented participants from reaching a negative conclusion about the potential of redesign of dwellings, as they could select the most feasible design pathway.

Studio organisation

This matrix *[4]* combined four dwellings with three project briefs, resulting in twelve possible combinations. Design methodologist Nigel Cross suggests that such a limited number of design variations at the initial stage 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 searching too long for multiple possible variants during the design process.[18] The first brief proposed sharing a home between two equal, small households. The second



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4 Matrix for exploration of four dwellings and three project briefs. The project briefs depicted are, from top to bottom, two small separate households, a reconstituted family home and a care-requiring household with a supporting household

5 A sample of logbooks documenting the design process and serving as an 'external memory' for each group

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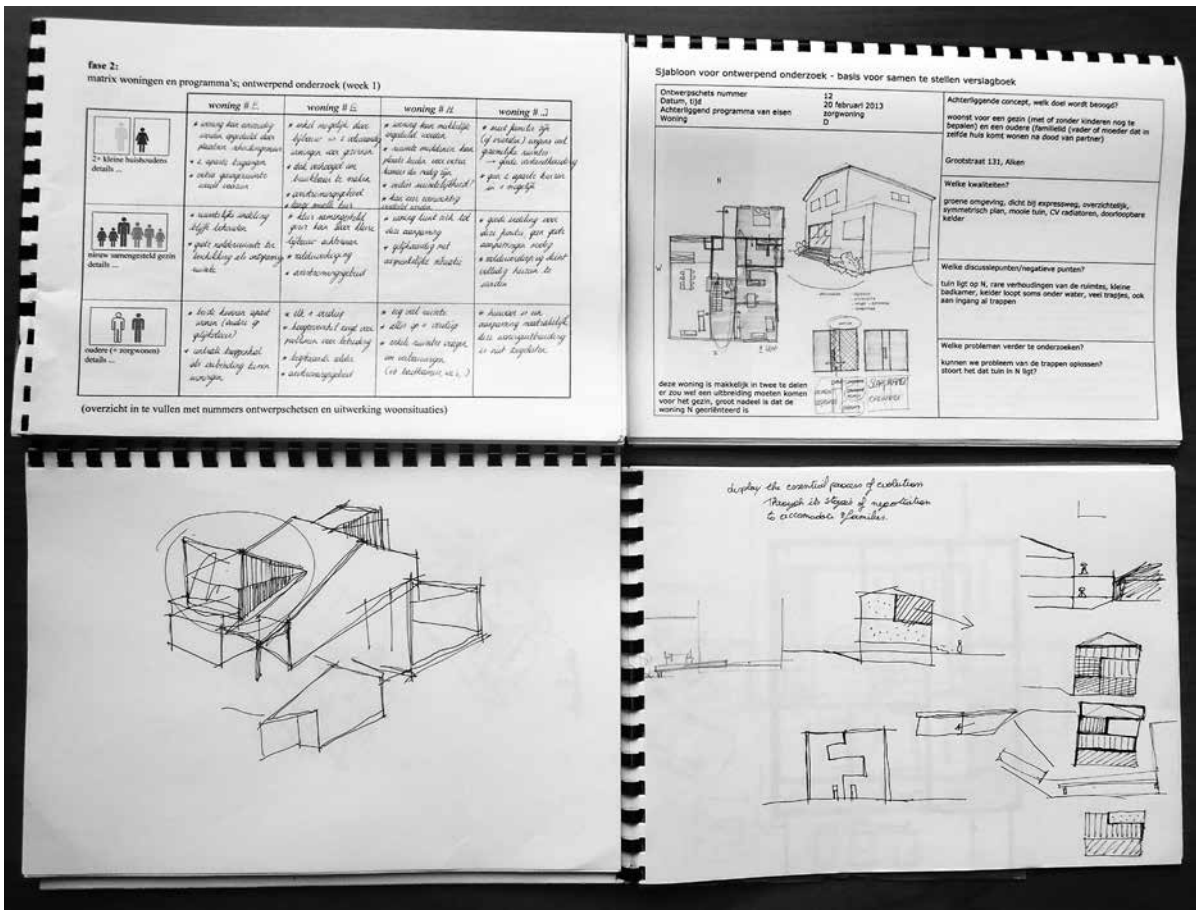
brief proposed sharing a home between a caregiving and a care-requiring household, and the third option suggested inhabitation by a reconstituted family of two adults with children from earlier relationships. This form of inhabiting a dwelling is the most family-like, and characteristically leads to a fluctuating level of home occupation as children live with both of their (separated) parents intermittently. Consequentially, the house has a number of permanent (adult) inhabitants and a number of temporary (juvenile) inhabitants. To outline clear conditions for a feasible form of sharing a dwelling, groups were free to detail a household situation and its spatial demands, and this range from hard to soft subdivision allowed them to choose a clear position.

The first stage of the workshop consisted of an analysis of the dwellings provided and an exploration of the opportunities offered by the matrix. In practice, the work was divided among the members of the groups, with each student looking in detail at one dwelling and comparing the results in group discussions. This process was completed by making sketches of solutions for each combination and assessing the feasibility of the proposed direction through comparison. The proposal of twelve options that the students could explore ensured a prolonged study of different alternatives in a phase of iterations between detailing a project brief and proposing a provisional design.[19] The groups documented their design decisions in a logbook, which used a template that 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 *[5]*. It also 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 group aims for with this design? What are the flaws of the proposed complex? 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 exploratory sketches and 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 of dwelling and project brief. In line with a categorisation of sketch types proposed by Eugene Ferguson, the produced images are used as '*thinking*', '*talking*', and '*storing* sketches'.[20] Their storage in the logbook makes individually created drawings accessible to all group members, and they become part of the group's 'external memory'.[21] This exploration phase concluded with the group choosing the combination it considered most feasible while still a challenge to the group's design skills. This selected combination formed the project brief for the phase of project elaboration, which was closer to a traditional design project as it required adhering to common criteria of design quality set by the faculty and the practising designers who tutor the students.



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How the students responded

The authors organised the diverse student proposals into three emerging narratives.[22] These narratives illustrate the conditions of functionality, daily use and architectural interventions under which a concept becomes feasible and plausible. In the context of this article, the categorisation focuses on the final outcome rather than on the pathways that were explored but discarded over the course of the process. The three categories are explained below.

Narratives of a prolonged flexibility

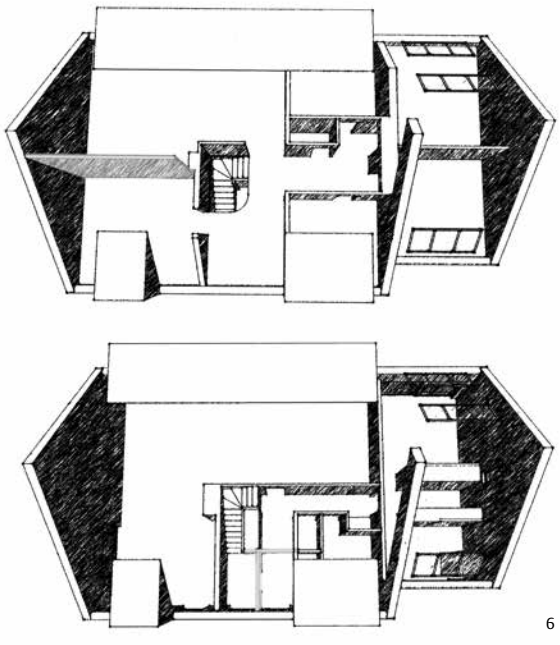
The first focus was based on the concept of redefining and revaluing traditional housing units in light of contemporary conditions, and was applied to two dwellings by three groups. All three groups gave priority to the notion of flexibility, as they considered the sharing of a dwelling by two households or a reconstituted family to be a temporary condition, requiring a projection into the future and the consideration of how the dwelling could be used if family conditions changed *[6]*. The main question for the designers became one of how to balance privacy and collectivity by determining which spaces would be 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 light of the current conditions became a challenge for these designers. This approach may be compared to implementing a user-focused, 'soft' interpretation of flexibility, rather than a 'hard' interpretation imposed by a designer, a distinction proposed by Jeremy Till and Tatjana Schneider.[23]

The elaborated strategies included envisioning the possibility of adaptation with minimal interventions at a later stage; in other words, a durable intervention that makes the house suitable for occupancy when a household continues to change. Consequently, these groups made distinctions between technical and organisational adjustments and between short-term and long-term interventions, and outlined scenarios informing the sequencing of modifications through time. In functional terms, the designers differentiated between quarters for privacy and retreat, spaces for shared use 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 use of multiple family rooms allow the inhabitants to join each other in daily activities, but also facilitate the option to organise separate activities occurring at the same time. One group proved how in the future a more strict separation between units could be made, while the other two groups argued that over time, the tight relationship between a traditional family unit and an ancillary unit could be forged into one larger unit.

Narrative for redefinition of un(der)used spaces

The second focus seeks to inscribe an additional housing unit by redefining secondary spaces, such as the garage and storage spaces, while leaving the original residential unit as intact as possible. This narrative projects a minimal adaptation of the basic typology, and analyses which spaces are essential for the quality of the existing dwelling and which spaces are not. The garage emerged from the analysis as suitable for redefinition, especially if additional storage space may be found in the basement or the attic. This conclusion resulted in the selection of an ancillary unit as a project brief. Further parameters considered are the usefulness of such a transformation in the future, imagining that both young and old inhabitants might come to reside in the added unit, which therefore requires good accessibility. The single group that chose this focus aimed to maintain the typical qualities of the selected dwelling, relying on the landscape of its garden, the proportion and organisation of its spaces, and the ample storage room on the ground level and in the garage, which allows for the addition.

The division into two separate units required that new insulation be incorporated into the design for the new residential unit to conform with contemporary regulations for energy efficiency, while the facade of the remaining unit remained untouched, with the group arguing that such interventions might be undertaken in phases, depending on the budget and ambitions of the two inhabiting households *[7]*. Complete accessibility for a potential wheelchair user as a resident became an equally important element in this narrative. This aspect affected the organisation of interior spaces and the sloping entrance pathway to the ancillary



6 Design demonstrating its flexibility during consecutive phases: the light grey walls indicated may be added (below, ground floor) or removed (above, first floor) at a later time. In the first phase, the dwelling can be inhabited by a reconstituted family. In a follow-up phase, additional light walls lead to further subdivision

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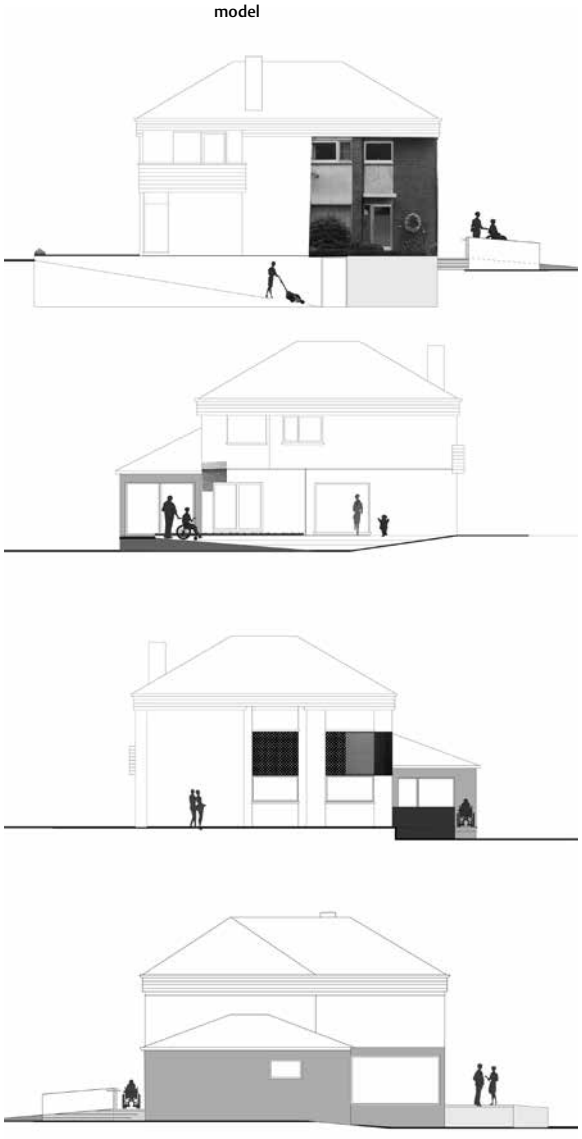
unit. Furthermore, the relationship to the existing dwelling and the backyard became important aspects, as the designers organised interesting views from the inside onto the garden and connected the units by means of a central terrace, which is accessed from the main living spaces of both dwellings. This definitive transformation is based on a close relationship between the two residential units, requiring specific household conditions.

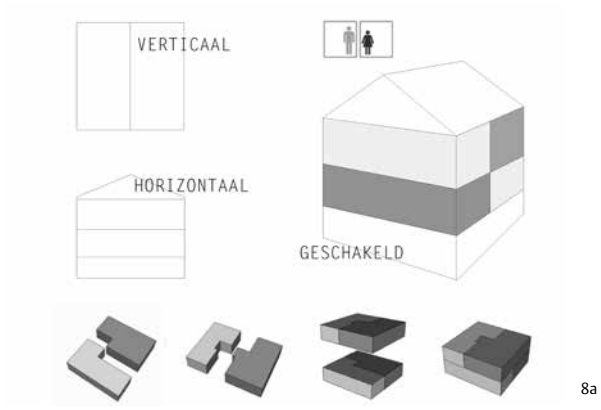
Narratives for novel typologies

Four groups narrowed their feasible opportunities to the projection of two distinct housing units for large dwellings. The size and organisation of these particular 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 varied modes of

7 Proposal imagining an ancillary unit that functions separately and leaves the existing dwelling intact, which can be read from the elevation

8 *a–d* Design for two interlocking dwelling units. This complexity allows for equal lighting conditions and innovative dwelling types. Scheme, perspective drawing of north and west facade, and photographs of the model





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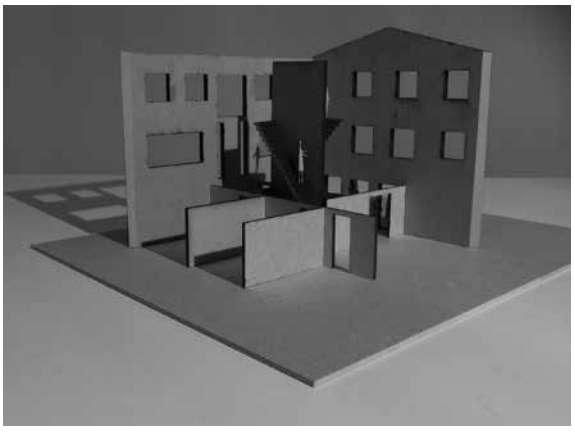

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subdivision. The students therefore argued that their design narrative should revolve around determining which would be the optimal design approach to profit from the size of these dwellings. Built structures challenged the designers to develop a meaningful transformation that respected architectural values and took structural and functional deficits as focal points. This argumentation required the design brief to resolve the programme within the existing structure, and raised the issue of how inefficient parts of a building could be dealt with to support occupancy by two households instead of one.

The elaborated designs of four groups with this shared focus are diverse and reflect both complexity and simplicity. To illustrate, one group emphasised simplicity by subdividing a large house into two stacked apartments. The group argued that this arrangement would also offer the greatest flexibility for the 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. The other groups accentuated complexity: instead of simply stacking two apartments, one group chose to interweave two dwellings, bringing both units the benefit of direct access to the garden and a good orientation and lighting of all rooms *[8]*. This category puts emphasis on inhabitation of a neighbourhood at higher densities without increasing the footprint of buildings, yet still providing direct connection to this green environment or the garden. Such projects point out alternatives to the generic layout of large apartment buildings that are emerging as *Fremdkörper* in rural settings.

The process feeds back into the research project

The projects described represent novel forms of use and reinterpret functionally determined buildings. Participants' different approaches demonstrate a spectrum of possibilities, from low-budget, temporal solutions on the one hand to profound, long-term interventions on the other. The heuristic of the matrix motivated the designers to critically select a feasible combination of a project brief and a case study house. The supplementary documentation of the design process allowed the inclusion of these qualitative, design-based data in the overarching research project on large dwellings in Flanders. The table *[9]* gives an overview of the arguments in terms of the project brief, the occupancy pattern, and the architectural project responding to these conditions. Two main results feed back into the research project.

Primarily, the proposals outline the gaps between the potential of the houses and certain obstacles for retrofitting. Such gaps hinder the development of high-quality projects and become more clearly defined when the developed student projects are compared to the outcome of investigations within the research project. In particular, the limiting policy with respect to municipalities and a negative perception among home owners and housing professionals emerged from the research project as basis of resistance against housing adaptation.[24] Such obstructions were bracketed and taken out of the equation to allow the studio participants to be able to develop innovative design arguments. In the first narrative (prolonged flexibility), energetic performance was bracketed in the initial phase, which allowed for a search for typological transformations in order to provide arguments for

9 Table showing an overview of the arguments in terms of the project brief, the occupancy pattern, and the architectural project responding to these conditions

Narrative	Project briefs	Narrative elements	Design strategies
1. Prolonged flexibility	Reconstituted family, ancillary unit	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. Un(der)used spaces	Ancillary unit	Retain original family house Re-use 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. Novel typologies	Complete subdivision	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.

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improving an aged dwelling at later stages. A step-by-step plan for home improvements was the result. The second narrative (redefinition of un(der)used spaces) placed the quality of a valuable dwelling in brackets and analysed which spaces are not part of this core value: these underutilised spaces became the material for a design elaboration. In the third narrative (novel typologies), the legal framework of restrictive zoning plans became this bracketed parameter, which enabled a free search for alternative residential typologies.

In addition, the studio in its entirety can be seen as an exploration of the controversies present in the Flemish debate on housing policy and sustainability. Design tutors with significant professional experience and differing viewpoints influenced the choices the groups made and the concepts that were finally elaborated. The direct exchange between students and researchers follows an approach which, in the words of architectural theoretician Henry Sanoff, is 'seen not only as a process of creating knowledge, but simultaneously as education and development of consciousness, and of mobilisation for action'.[25] In the context of this studio, students, design tutors, and researchers were considered to be representatives of communities that benefit from such a joint cooperation. Their participation primarily challenges norms of knowledge production, as the perspectives of young professionals who are about to start working with that knowledge are specifically involved.[26] The groups proposing narratives for a prolonged flexibility explored these professional contradictions extensively. In their proposals, projections of spatial requirements over time have assisted the designers into devising flexible, stepwise scenarios, envisioning the proper investments for each phase and thus preventing unnecessary interventions and costs. Such strategies are most relevant for households outside central, urbanised areas, where disproportionate investment areas are undesirable but temporary solutions can still be executed, resolving emerging needs for a limited timeframe, after which all options for an appropriate long-term strategy remain available. Such designs, developed for average-sized dwellings, are most flexible, feasible, and relevant, because such solutions might be applied to a significant part of the housing stock and respond to diverse household compositions. Thus, the studio has delivered design typologies that rarely are considered in practice but that do offer distinct answers to more efficient use of buildings. These results are explanatory case studies that illustrate general, substantive arguments about contemporary housing demands, requiring a higher level of flexibility of the built environment.

Limits and opportunities of practice-based enquiry in the design studio

The presented analysis demonstrates how conflicts between the traditional norms of research and design can be overcome, because both realms retain their proper mode of operation. Several conclusive insights emerging from this interaction between research and design teaching require further explication.

Although risks of involving the results and processes of a design studio in the context of a research project were taken into account, some limitations are evident. The participants in the studio on dwelling transformation focused on finding a solution, which made exploring the matrix without bias difficult for them. This perspective relates to an argument made by Bryan Lawson in his book *How Designers Think*.[27] He describes an experiment conducted with advanced students of science and (architectural) design, in which the participants were asked to solve a spatial puzzle that 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 6,000 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 scientists were 'problem-focused', working toward an understanding of the puzzle and trying to understand its rules, whereas the architecture students were 'solution-focused', simply trying to achieve a satisfying result by trial and error, without worrying about the system behind the puzzle. In this study of Flemish houses, participants 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.[28] Although in the design studio logic was sought for in the organisation of the workshop and the participants were encouraged to document their thought processes, all tacit arguments and personal preferences did not likely become explicit during this structured process.

Furthermore, the fact that participants made very diverse analyses of the dwellings under study demonstrates emerging differences in opinion on the feasibility of dwelling subdivision. A summation of negative characteristics (such as poor lighting conditions or inefficient organisation) provided grounds for one group to accept this as a challenge and for another group to opt for a different dwelling. These controversies raised awareness among the participants of differences in possible pathways for dealing with the housing question, each with its own strengths and weaknesses. While this awareness enabled participants to categorise a number of transformative strategies, structuring the critique of the involved designers on the level of flexibility of reoccurring housing types or options for extending the life span of a building was more difficult.

While these limitations point to the need for further experimentation, the results reveal a fruitful exchange between architectural design, education, and research. The most productive aspect of this experiment is how it offers detailed insights into a

https://doi.org/10.1017/S1359135515000275 Published online by Cambridge University Press

contemporary spatial problem. Thus, it ties in with recent international discussions that revolve around the changing role of an architect and the skills he or she should possess. Recurring criticisms of architectural education address the preparation of young, graduated architects to enter their profession and their capacity to contribute to societal concerns.[29] Closely interlaced with education, architectural research is equally subject to criticism. In the context of complex societal problems, for example with regard to sustainability and globalisation, Peter Buchanan brings the impact and relevance of academic research in architecture up for discussion.[30] The response of this studio has been to establish a platform for exploring a relevant socio-spatial issue on which there is no professional consensus, and to which architects can respond with diverse design strategies. It provided a stage for the ongoing discussion on housing production, guided by the exploration of novel design concepts.

Hence, the authors propose a studio structure defined on the basis of the central questions and (tentative) outcomes of a long-term research project, delimiting the design brief for students, as a condition for reciprocity between architectural research and education. Such a structure facilitates profound exploration of a topic even within a short time span. In this case, the exercise offered an arena for critical debate as an interlude in the master's education. This approach is complementary to regular models of apprenticeship in the design studio central to architectural education, but much needed in a local professional culture where architects increasingly present their portfolios to cover both design and research projects. It is therefore imperative to cultivate modes of enquiry suitable to architecture that allow designers to develop well founded arguments in the face of complex societal issues without clear pathways to a solution. Moreover, this interaction facilitates the development of more co-productive approaches, yielding relevant insights for all parties involved – students, professional designers, academic researchers, and other societal stakeholders.

Notes

1. Flanders is the northern Dutch-speaking region in the Federal State of Belgium.
2. 'Large underused dwellings in Flanders. Development of architectural and users' strategies in view of demographic trends and ecological constraints', Research project (2010–13) at KU Leuven and Hasselt University (Belgium) funded by FWO – the Research Foundation Flanders. The project was led by professors Hilde Heynen, Koenraad Van Cleempoel, Dominique Vanneste, and Michael Ryckewaert.
3. 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', in *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* (epub ahead of press, 2014), pp. 1–29 (p. 3).
4. Bartiaux and others have drawn a comparison between the average size of houses in several European countries: after Luxemburg, Belgium is the runner-up with an average housing size of more than 130 m^2, demonstrating a sharp contrast with countries such as Sweden, the Netherlands and the United Kingdom, with average housing sizes between 70 and 80 m^2. Françoise Bartiaux, et al., 'Socio-Technical Factors Influencing Residential Energy Consumption' (Brussels: Belgian Science Policy, 2005), p. 81.
5. Hilde Heynen, 'Belgium and the Netherlands: Two Different Ways of Coping with the Housing Crisis, 1945–1970', *Home Cultures,* 7 (2010), pp. 159–78; Stefan Devoldere, 'Reframing Suburban Life', in Ilse Degerickx, et al., (eds.) *Architectural Review Flanders N°10: Radical Commonplaces: European Architectures from Flanders* (Antwerp: Flemish Architecture Institute, 2012), pp. 162–75.
6. Marijn van de Weijer, 'Reconfiguration, Replacement or Removal? Evaluating the Flemish Post-War Detached Dwelling and Its Part in Contemporary Spatial Planning and Architecture' (unpublished doctoral thesis, KU Leuven and Hasselt University, 2014).
7. Currently, for the simplest form of home sharing permit, applicants need to prove that one of the sharing households requires certain care; their unit can only cover one-third of the total building surface, and needs to be integrated into the main dwelling as soon as the requirement for care disappears. The annex may not be sold or rented at that time. A permanent subdivision of a house would require a more elaborate procedure leading to a full building permit.
8. In line with the argument of Will Hunter, this article sees the connection between research, education and practice as crucial for the architectural discipline. See: Will Hunter, 'Alternative Routes for Architecture', in *Architectural Review,* 232 (2012), pp. 88–9.
9. Workshop Dwelling Transformations, 18 February–1 March 2013. Participating students: Sarah Adriaensen, Jens Casselmans, Audrey Cipullo, Lynn Croes, Kristoff Cuppens, Marieke de Jong, Ilse Deketelaere, 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, and Jeroen Vercruysse. The workshop was organised in cooperation with designers Phillippe Swartenbroux, Victor Simoni, Jo Klaps, and critics Ruth Stevens and Dr Roel De Ridder.
10. The inhabitants were willing to invite the students to their home for their fieldwork and responded to questions prepared by the participants.
11. These lectures included an introductory lecture on the research project (Marijn van de Weijer), a lecture of a practising architect (Saidja Heynickx), of an

https://doi.org/10.1017/S1359135515000275 Published online by Cambridge University Press

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).

12. Peter Buchanan, 'The Big Rethink: Architectural Education', in *Architectural Review,* 232 (2012), pp. 91–101.
13. David Salomon, 'Experimental Cultures: On the "End" of the Design Thesis and the Rise of the Research Studio', in *Journal of Architectural Education,* 65 (2011), pp. 33–44 (p. 42).
14. Ursula Emery McClure, 'The Good, the Bad, and the Ugly: Use and Abuse of the Research Studio', in *Journal of Architectural Education,* 61 (2007), pp. 73–5.
15. Chris Rust, 'Unstated contributions: how artistic inquiry can inform inter-disciplinary research', in *International Journal of Design,* 1 (2007), pp. 69–76.
16. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (Aldershot: Ashgate Publishing Limited, 1983).
17. An additional goal of the participants is of course to get good grades. Because of the double goal of this workshop, grading was split up, with one-third of the grade determined by a preliminary jury (the authors and one critic), evaluating how the exploratory process was executed, and two-thirds of the grade determined by a jury of two design practitioners and three critics, evaluating the quality of the final product.
18. Nigel Cross, 'Expertise in design: an overview', in *Design Studies,* 25 (2004), pp. 427–41.
19. Cynthia Atman, et al., 'A Comparison of Freshman and Senior Engineering Design Processes', in *Design Studies,* 20 (1999), pp. 131–52. Atman et al. have conducted research on design skills of junior and senior design students; they propose a consideration of a limited number of alternatives in early design stages as an advanced design skill that leads to better project results. This involved a process of formulating questions, which lead to follow-up, more precise questions. See: Schön, *The Reflective Practitioner,* p. 136.
20. See: Eugene S. Ferguson, *Engineering and the Mind's Eye* (Cambridge: MIT Press, 1992), pp. 96–7, quoted in Remko van der Lugt, 'How sketching can affect the idea generation process in design group meetings', in *Design Studies,* 26 (2005), pp. 101–22 (pp. 102–3).
21. van der Lugt, 'How sketching can affect the idea generation process in design group meetings', pp. 108–11.
22. Two of the elaborated narratives emerge from the work of multiple groups, and one of them is explored by a single group of students. Two out of the ten groups were not considered in this categorisation, because their decision-making process was not documented clearly enough.
23. Jeremy Till and Tatjana Schneider, 'Flexible Housing: The Means to the End', in *Architectural Research Quarterly,* 9 (2005), pp. 287–96.
24. van de Weijer, 'Reconfiguration, Replacement or Removal?', pp. 223–30.
25. Henry Sanoff, 'Editorial, Special Issue on Participatory Design', in *Design Studies,* 28 (2007), pp. 213–15 (p. 214).
26. 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', in *Design Studies,* 28 (2007), pp. 325–40.
27. Bryan Lawson, *How Designers Think* (London: Architectural Press, 1980), pp. 30–2.
28. 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 Nigel Cross (ed.), *Designerly Ways of Knowing* (London: Springer-Verlag, 2006), pp. 43–61.
29. See: Volume 16 (2012) of this journal on the architecture of pedagogy, in particular Gordon Murray, 'Education for a smarter profession', *arq: Architectural Research Quarterly,* 16 (2012), pp. 281–4.
30. Buchanan, 'The Big Rethink', p. 93.

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arq gratefully acknowledges:
Ilse Deketelaere, Elien Rummens, Nicki Tits, Marieke de Jong, 7
Dwelling Transformations Students 2013, 5
Gertjan Madalijns, Leen Peters, Sarah Stevens, Thais Van Riet, 6
Melissa Vanoppen, Néline Meuwissen, Paulien Goffinghs, Stéphanie Thys, 8
Marijn van de Weijer, 1–4
Authors, 9

Acknowledgements

This research was supported by The Research Foundation Flanders - FWO (grant#G.0599.10) for the 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. Hasselt University facilitated the organisation of this related design studio. The authors warmly thank the participating students, the design tutors, and the experts who lectured during the workshop. We also like to thank two anonymous reviewers for their constructive criticism.

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Koenraad Van Cleempoel studied Art History in Louvain, Madrid and London, where he obtained his PhD degree at the Warburg Institute. Since 2005 he has been engaged in establishing and directing a research unit in heritage and adaptive reuse at Hasselt University. He supervises several PhD students working on aspects of reuse and research by design.

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https://doi.org/10.1017/S1359135515000275 Published online by Cambridge University Press