Stuff and Space in the Home

How can an understanding of material possessions help to inform spatial storage design in UK housing?

by

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Abstract

In the field of architecture, there has been little research on how the accumulation of material possessions is impacting on space for living in the home. There has been little understanding of what households own, collect, store and dispose of, nor the implications this might have for domestic space design, especially that for storage. The *'stuff'* that inhabitants own is largely overlooked in current debates on housing policy and design. Yet, householders can have their quality of life, well-being and happiness negatively affected by material possessions, the '*stuff*' they keep in their homes.

This study presents the evolution of a seven-year critical, exploratory and reflective enquiry into the relationship between material possessions and housing design. By better understanding the nature of '*stuff*' and space in UK houses, they can be better designed. The enquiry is articulated through five peer-reviewed outputs, which together answer the overall research question, *"How can an understanding of material possessions help to inform spatial storage design in UK housing?"*. The research outputs presented in this study vary in terms of their housing focus, with the first three Outputs being wide ranging, and final two Outputs narrowing down the object of study to enable a clear focus for engagement. Throughout the enquiry, an explorative and reflective multi-methodological approach is followed, combining design research with a visual / sensory ethnography, which is augmented with architectural visual probes, leading to *'a visual ethnography of a design process'*.

The findings from Output #1 present a unique graphical exploration of how the design of domestic space has changed over the last 200 years and identifies the role that material possessions have played in this change. Output #1 takes the form of a series of graphical timelines and an interactive website. This is followed by an innovative participatory exhibition (Output #2) that captures the intellectual agenda of the house as a *'container'* and the household contents, the '*stuff*', as the *'contained'*. This exhibition presents a new perspective on the ordinary, by showing how everyday possessions impact the way the inhabitants occupy their homes. The

past and present qualities of the domestic space are then captured in a 3D architectural model. The model, along with a peer-reviewed journal article exploring its use in the research, form Output #3. Then follows the theoretical development of a new conceptual framework of material possessions that identifies universal characteristics and categories to be used in housing design, which also includes a set of room- and house-specific strategies for storage. This is presented as Output #4, a peer- reviewed journal article. Finally, the framework is tested in a storage-focused design intervention with practising architects, and proposes innovative housing design solutions for the standardised house type in the UK. This is also in the form of a peer-reviewed journal article (Output #5).

The study concludes that the design of future homes could better support inhabitants' quality of life and well-being if space for storage was better understood. The study argues for a more informed approach to housing design, where storage is valued and the space provided is flexible, so the reality of inhabitants' '*stuff',* and its associated well-being implications, are considered.

Acknowledgements

Thank you to Dr Paul Shepherd, still my husband-to-be, for his support over the last seven years. I would not have made it here without you.

Also, thanks to my supervisory Dr Sonja Oliveira, Dr Danni Sinnett and especially to Professor Katie Williams, for keeping me on the straight and narrow, and for trusting that I would finish.

Finally, thanks to Leo, my fab son, who has been so understanding of having a mum that never stops working!

I dedicate this thesis to my grandmother Teodora Gracia, and to my fake-grandmother Asuncion Albiol.

Submitted Works

Output #1: *'Timelines of Housing Typologies in a Social Context'* - Exhibition

'www.housingmatteruk.com' - Interactive Website.

Output #2: *'Not-at-present-in-use-maybe-never-again Objects: Dead Storage'* - Participatory Exhibition.

Output #3: *'Undressing UK Housing'* - Architectural Model.

'The Architectural Model as Augmenting a Sensory Ethnography' - Peer-reviewed Journal Paper.

Output #4: *'Too Much 'Stuff' and the Wrong Space: Conceptual Framework of Material Possessions'* - Peer-reviewed Journal Paper.

Output #5: *'Prioritising Storage Practices: A New Approach to Housing Design Thinking'* - Peer-reviewed Journal Paper.

Credited Learning

No part of this submission has been, or is being, submitted for another academic award.

The following training has been completed as part of this DPhil:

Course Title	**Mark Achieved**	**Number of Credits**
Research Practice (UA1AFR-30-M)	74%	30
Research Writing (UFCEL6-15-M)	82%	15

Along with 20 credits of Accredited Learning, this exceeds the minimum learning requirement (60 credits) for the DPhil.

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1 Introduction

This report presents five outputs that represent seven years of study on the relationship between material possessions and home design in the UK. It is made up of three clearly defined parts. Part A sets out a summary of the five published outputs, including the research questions they address and their contribution to knowledge. Part B then articulates in detail a critical commentary around the work. Part C contains the appendices, one per output.

The purpose of the research presented here is to bring a new perspective to the forefront of the housing problem: the lack of consideration of material possessions (or *'stuff'*) when designing homes (see Figure 1). It explores how domestic space has changed over time, in order to better understand the dynamic relationship between space and possessions, so contemporary housing design thinking can be informed and improved, and ultimately support a better quality of life and improved well-being of households. The research argues that space for storage of possessions is an important aspect of housing design, and that today's houses are not designed to account for changing storage practices / material possessions. It finds that more attention to storage is needed, not only in housing design, but also in the housing delivery process. Figure 2 articulates the research problem of homes not being designed well for today's material possessions, suggesting that a better understanding of the housing problem, and the accumulation of material possessions in the home, can help design better houses.

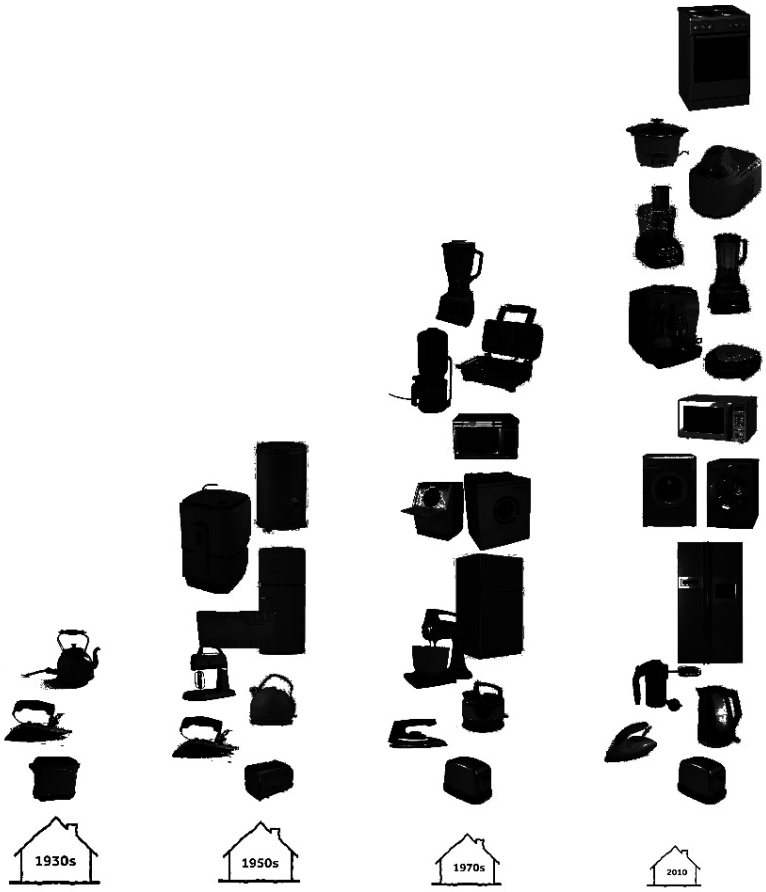

Figure 1 Too much stuff while space in new homes has shrunk

a

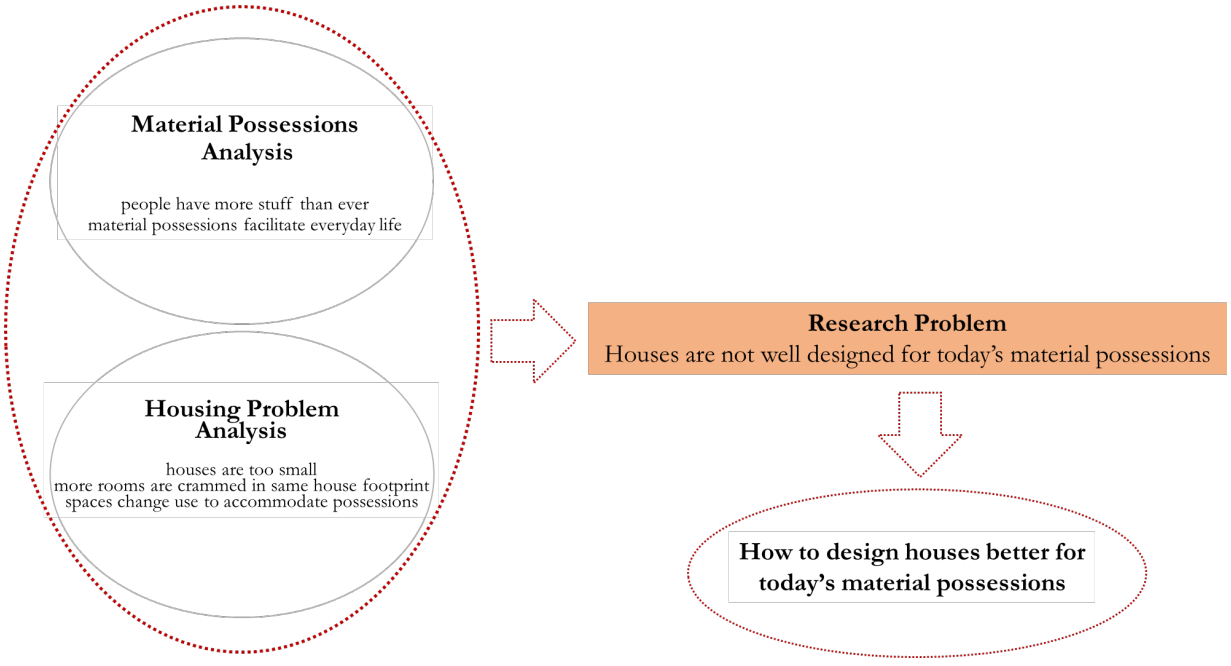

Figure 2 Identifying the research problem

Many homes in the UK are inundated by material possessions, which can affect inhabitants' quality of life, health and happiness (Miles, 1998; Cwener and Metcalfe, 2003; Smith and Ekerdt, 2011). Stress, low mood and insomnia have been associated with the material possessions overwhelming spaces in today's houses (Saxbe and Repetti, 2010; Raines et al., 2015). At the same time that there has been a general increase in the amount of material possessions that people accumulate during all periods of their life (Schor, 1998; Hand, Shove and Southerton, 2007; Carr et al., 2012), the amount of space in newly-built houses in the UK has been reducing (Williams, 2009; RIBA, 2011; Park, 2017) (see Figure 1).

The UK is currently in the midst of a national housing crisis. More houses need to be built to accommodate the increase in the number of households being formed (DCLG, 2017a; Wilson and Barton, 2018). These houses need to be affordable, but also provide adequate space for households to live comfortably. However, the UK is building the smallest houses in Europe (Williams, 2009; Foye, 2017), with the smallest sized rooms and with insufficient space, not only for living, but also for storage (Karn and Sheridan, 1994; CABE, 2005; 2009; RIBA, 2011; 2015).

This study focuses on the UK and the smallest housing units: the standardised house type. It engages architects to explore how a design approach to contemporary housing design thinking could be considered in the future, if the impact of material possessions were carefully considered. By including storage in the architects' agenda, this study provides a new perspective on housing design thinking that truly reflects the needs of the inhabitants.

For the purposes of this research a wide definition of '*inhabitants'* is used (see Section 7.2). Gender, ethnicity and different economic and socio-cultural backgrounds, for example, were not considered within the scope of this study. These complex and multi-layered dimensions of inhabitants within housing design, whilst very important, could not have been meaningfully considered in sufficient detail within the scope of this DPhil (this has been included as a limitation of the study in Section 10.3).

Five peer-reviewed outputs answer the overall research question of the study, which is *"How can an understanding of material possessions help to inform spatial storage design in UK housing?"*. Figure 3 articulates how the research question, associated research sub-questions and objectives are addressed by each of the five outputs. In some cases, the sub-questions and objectives are addressed by more than one output.

The overall methodological approach used in the outputs combines design research (Frayling, 1993; Murray, 2013) with visual / sensory ethnography (Pink, 2009; Pink, 2011). Design Research is a methodology that has been applied by many to rethink an architectural problem from a different perspective. Sensory / visual ethnography is a methodology established as a means to understand people's lives and experiences. Both methodologies are explorative and reflexive (Rendell, 2004; Pink, 2011; Murray, 2013), which can make them appear dynamic. While the sensory ethnography is used to draw out people's experience of space, the design research methods explore the physical nature of space. In order to investigate particular aspects of this study, a combination of the two methodologies has been developed, whereby a sensory ethnographical methodology is augmented with architectural visual probes, '*a visual ethnography of a design process'*. This has been done by others in the past (Hemmings et al., 2002; Boehner, Gaver and Boucher, 2014) using *'domestic probes'*, but there is currently no record of *'architectural probes'* being tested in this context.

The research outputs presented in this study vary in terms of their housing focus. The early outputs (#1, #2 and #3) consider a range of housing types, though in Outputs #1 and #3, terraced houses associated with large suburban speculative developments (Muthesious, 1982) are a particular focus. Outputs #4 and #5 narrow down the object of study to the most common newly-built typology, the 3-bedroom standardised house type (Hooper and Nicol, 2010) to enable a clear focus for engagement.

The Outputs presented in the next part of the report (Part A) illustrate the evolution of an enquiry into the relationship between material possessions and housing design. Then, Part B

presents a critical commentary on the published work. The Appendices contain more detail on the Outputs themselves, such as photographs (when the output is a physical object or event) or a full publication (when the output is a journal paper).

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Research Questions

Research Outputs

How can an understanding of material possessions help to inform spatial storage design in UK housing ?

Sub-Questions

1. How have material possessions influenced home design over the last 200 years in the UK and how have they affected the way people inhabit their homes?

2. What are the characteristics of today's material possessions, and how do they influence architects' approaches to the design of standardised house types?

3. To what extent can the answers to questions 1 and 2 help to inform the spatial storage design of standardised house types?

Objectives

1. To understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change.

2. To identify the characteristics (qualities and quantities) of material possessions and storage practices in today's homes.

3. To examine in the literature how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home.

4. To generate a storage-focused characterisation and design framework for material possessions in the home.

5. To engage with practicing architects to elaborate on these characteristics and storage practices, and to test the usefulness of the framework.

6. To generate new approaches to storage design in the most common standardised house type that could improve inhabitants' use and experience of the home.

Housing Matters UK – A Graphical Narrative of Historical Changes to UK Housing - Exhibition

www.housingmattersuk.com – Interactive Website

Output #1

Undressing UK Housing – Architectural Model

The Architectural Model as Augmenting a Sensory Ethnography – Journal Paper

Output #3

'Not-at-present-in-use-maybe-never-again Objects: DEAD STORAGE'- Participatory Exhibition

Output #2

Too Much 'Stuff' and the Wrong Space: A Conceptual Framework of Material Possessions – Journal Paper

Output #4

Prioritising Storage Practices: A New Approach to Housing Design Thinking – Journal Paper

Output #5

Figure 3 Research questions, sub-questions and objectives addressed by each output

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Part A – The Outputs

Part A presents the Outputs that form the body of work of the DPhil, showing the evolution of an enquiry into the relationship between material possessions and housing design.

Each Chapter outlines the research questions and objectives that have been addressed by each output, the data collection and research methodologies used, the key findings and importance of the work presented, and their originality and contribution to knowledge. A final section in each of the Chapters identifies the learnings from the Output's substantive analysis, and how these informed the development of the next Output.

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2 Output #1: Housing Matters UK: A Graphical Narrative of Historical Changes to UK Housing

In order to understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change, a historical data collection of key influences, facts and events was carried out, so that key influential themes could be identified. This historical data collection addressed research Sub-question 1, and Objective 1 (see Part B Chapter 8) and was published as a series of ***graphical timelines*** displayed in an exhibition and an interactive website (see Appendix A).

2.1 Data Collection and Research Methodologies

Data was collected through a *literature review* and a *desktop study* of historic housing plans. The data was then *analysed thematically* to identify themes, and communicated as timelines using a *design research* methodology (see Sections 9.3 and 9.4).

2.2 Key Findings and Importance of the Work

The thematic analysis of the data collected identified five key themes that have impacted on housing design: Economics and Industrialisation; Health; Legislation and Policy; Society; and Lifestyles and Technology. A further theme, on the changes to domestic space of a terraced house typology, emerged from the desk study, where *'generic'* types of small, medium and large houses were developed. The *'generic'* house types were also developed as 3D physical models, so that the changes of space over time could be analysed, especially the impact of kitchen and bathroom spaces on the house overall.

Six graphical timelines were produced that capture the changes that have influenced housing design since the beginning of large speculative developments in the UK 200 years ago, providing a unique visualisation of the development of the UK's housing stock. The timelines graphically show a historical dimension to the concept of domestic space and the adaptation of housing to meet contemporary needs. The study found that the size of small terraced houses (two-

bedroom) has not changed over time, whilst medium- and large-sized (three- and four-bedroom) terraced houses have shrunk. The study also showed that the earlier typologies (Georgian, Victorian and Edwardian) were the most modified, via additions such as kitchens and bathrooms, whilst the typologies built between the 1930s and 1970s were the most spacious. Bathrooms were shown to be responsible for the biggest changes in overall footprint, whilst kitchens have halved in size in medium- and large- houses. The study also provided an illustration of the change in the priorities and functions of space in the home, and highlighted the disconnect between available storage space and the amount of material possessions that a household contains.

2.3 Originality and Contribution to Knowledge

This is the first time such a detailed graphical historical study has been undertaken with a focus on UK housing typologies. The timelines show how housing design has changed in response to the six key drivers found in the literature. A focus that emerges throughout this historical study is the relationship between housing design and the accumulation of material possessions.

Following a peer-review process, these timelines were selected for exhibition at the Architecture Centre, Bristol, from the 25th January to the 25th March 2012, in the event entitled *'Timelines of Housing Typologies in a Social Context'*. As part of the exhibition, a public talk and two exhibition tours were facilitated with the general public (see Figures 4 & 5).

Figure 4 Timelines being explained during a public tour of the exhibition.

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Figure 5 Physical models in the exhibition and the public discussion.

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The timelines were then developed into an interactive website, *Housing Matters UK* (www.housingmattersuk.com), which captures in a contemporary UK context, the intellectual agenda of the house as a *'container'* and the household contents, the 'stuff', as the *'contained'* (see Figures 6 and 7). This output therefore contributes to advancing the knowledge of the subject of housing design and its associated material possessions.

Figure 6 Homepage of www.housingmattersuk.com

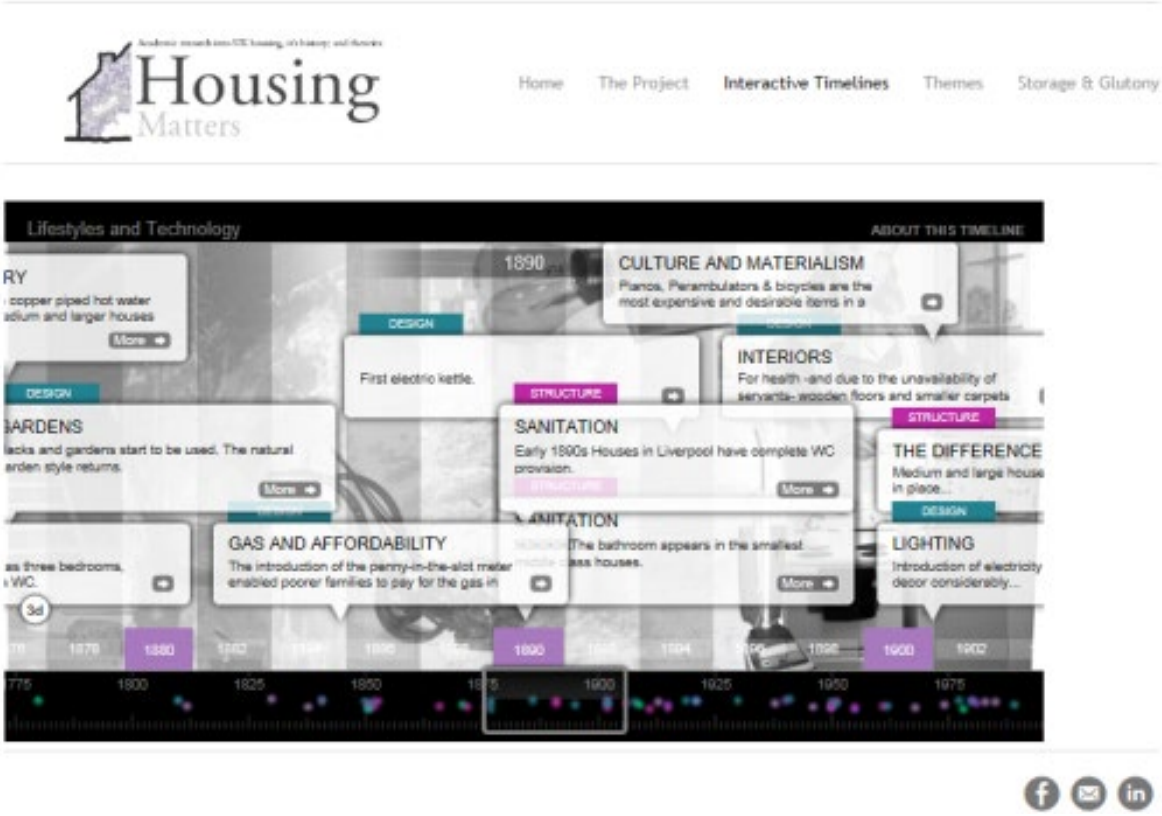

Figure 7 Interactive timelines – www.housingmattersuk.com

The study was presented at the UK / Ireland Planning Research Conference 2012, and at research seminars at the Universities of Bath, Edinburgh and Heriot-Watt. The Housing Matters UK project is the product of 18-months of research, part funded by EPSRC (under a Bridging the Gaps grant to foster interdisciplinary research), and by a UWE internal grant (Vice-Chancellor's Award).

The author was the Principal Investigator (PI) of the project, responsible for its intellectual development, the majority of the background research and the production of the timelines and website. The project had two Co-Investigators (CIs), Sarah Burgess and Dr Paul Pilkington, who brought their planning and well-being expertise to the building of the timelines. The project also had a steering board from industry and academia that helped peer-review the timelines as they were built. The interactive website was submitted to REF 2014.

2.4 Learnings from the Substantive Analysis

The six graphical timelines brought together an original visualisation of trends under themes of policy, society, industrialisation, health, the economy and technological advances that have taken place in UK housing over the last 200 years. The visual mapping of their evolution enabled the abstraction of these complex and multi-layered historical changes, and helped understand the disconnect between the available storage space and the amount of possessions that a household has. Storage revealed itself as reactive to changes in social, economic, technological and demographic drivers. For example, the Lifestyle and Technology timeline allowed the visualisation of the impact of central heating, plumbing and openable windows in terms of comfort in the home. This timeline also showed the proliferation of material possessions associated with technical innovations such as the washing machine, the fridge, the dishwasher, the DVD player, the iPad, etc. The mapping of these diverse historical themes against *'generic'* house plans of the terrace house, a typology historically linked with working-class dwellings (Muthesious, 1982; Ravetz, 1995; Nationwide, 2008), visually highlighted not only the changes to comfort or material possessions associated with the home, but also the changes these trends brought to the evolution of the physical domestic space over time. Whilst the diagrammatic plans of the two-, three- and four-bedroom terraced houses (small-, medium- and large-size dwellings) showed changes to the physical space of the home, the creation of a series of 3D physical scale-models of these *'generic'* houses (Figure 5) captured historical changes to the house layouts, construction, and the impact of standards (if any) influencing sizes and layouts over time.

Being able to analyse, abstract and synthesise the very complex and multi-layered information from the historical literature review and desktop study, and succinctly communicate this information visually through the graphical timelines (*design research*), enabled the historical dimension of the evolution of the concept of domestic space over the last 200 years to be captured. However, these graphical timelines were unable to capture the present reality of how

everyday possessions are currently impacting the use and experience of the home. The next stage of the DPhil (Output #2) therefore sought to unveil a new perspective on the ordinary, by using a participatory exhibition with an auto-photography method as part of a dynamic *visual / sensory ethnography* methodology with a supporting *design research* methodology. In addition, the information collected through the timelines was used to construct the architectural model that is part of Output #3.

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3 Output #2: Not-at-present-in-use-maybe-never-again Objects: DEAD STORAGE

Having graphically captured the historical dimension of the evolution of domestic space over the last 200 years (Output #1), the next stage of the DPhil sought a new perspective on the ordinary, by understanding how everyday material possessions currently impact the way we inhabit our homes. A ***participatory public exhibition*** titled, '*Not-at-present-in-use-maybe-never-again Objects: DEAD STORAGE'* was designed to engage the general public and capture how the inhabitants' everyday possessions are impacting the use and experience of the home. This participatory exhibition addressed research Sub-question 2 as well as Objective 2, (see Part B Chapter 8). The exhibition was held in the Architecture Centre, Bristol over seven weeks (March to April 2014). The exhibition was also used to gather data from the public for the DPhil (Output #2).

3.1 Data Collection and Research Methodologies

The exhibition used an *auto-photography* data collection method, alongside a *participatory event method* (the exhibition itself), which was then analysed using *thematic analysis*, as part of the *visual / sensory ethnography* with a supporting *design research* methodology (see Sections 9.3 and 9.4).

3.2 Key Findings and Importance of the Work

The participatory public exhibition was in itself a participatory design event, where the final shape and content of the exhibition was unknown to the researcher at the beginning. Initially, the exhibition started with forty-eight photographs taken by members of the public of their material possessions, displayed or stored. The photographs were collected online via the www.housingmattersuk.com website. During the seven weeks of the exhibition, two-hundred and thirty-four photographs were collected, of which one-hundred and seventy-two were exhibited from one-hundred and seven participants (see Figure 8). Photographs became the

mechanism by which both the researcher and the participants glimpsed, during a particular moment in time, how possessions were impacting the physical space of the home.

Figure 8 Photographs of the exhibition at the Architecture Centre, Bristol.

The photographs were thematically analysed so that the key representative characteristics and practices could be identified, which were used to carefully construct a series of collages for the next output, the architectural model (Output #3). The photographs gave insights into how inhabitants saw the stuff that occupies their homes. They also enabled six-core categories of material possessions to be identified, that reinforced and augmented the conceptualisation of material possessions developed from the literature (Output #4). These categories were: material possessions associated with specific rooms and spaces, those hidden away or displayed, those associated with cycles of use, those related to a specific point in the life of inhabitants, those related to maintenance and repair, and archival possessions. This event, therefore, captured concrete examples of categories of *'stuff'*. It gave an insight into where people keep their *'stuff'*

and the extent to which material possessions are taking over space in rooms. These examples were then used in the development of the conceptual framework for housing design (see Output #4).

3.3 Originality and Contribution to Knowledge

The design event captured the way possessions are impacting on the physical space of the home. This is, to the author's knowledge, the first-time that a participatory event with the general public (the inhabitants) has been used to gather this type of information. The photographic evidence captured during the event reinforced the disconnect, already identified through the graphical timelines (Output #1), between storage space and the amount of material possessions that a household contains. The design event brought a new perspective on the ordinary, by using photographs of material possessions that are normally hidden from the general public, and only seen by those who are part of the household or invited to enter as guests.

Most studies in the literature focus on material possessions located in specific areas of the house, such as the garage (Hirshman, Ruvio and Belk, 2012), open plan areas (Dowling, 2008) and the kitchen (Shove and Southerton, 2000; Shove, 2003), whereas this study looks at the totality of the home.

By asking people an open question, and giving them the freedom to choose what to show (or not), the participants revealed the characteristics of the material possessions that they own, and where they are located. In some cases, they exposed aspects of the home that are hidden, messy and never seen by invited guests (Figure 9). In others, they shared aspects that are displayed, carefully composed and exhibited (Figure 10). The collected photographs gave a completely novel view of *'stuff'* across the whole house. Whilst the established literature includes only very narrow and specific studies, this exhibition gave a visual collection of people's interpretation of how material possessions are impacting on the physical space of their own houses, thereby adding to the body of knowledge.

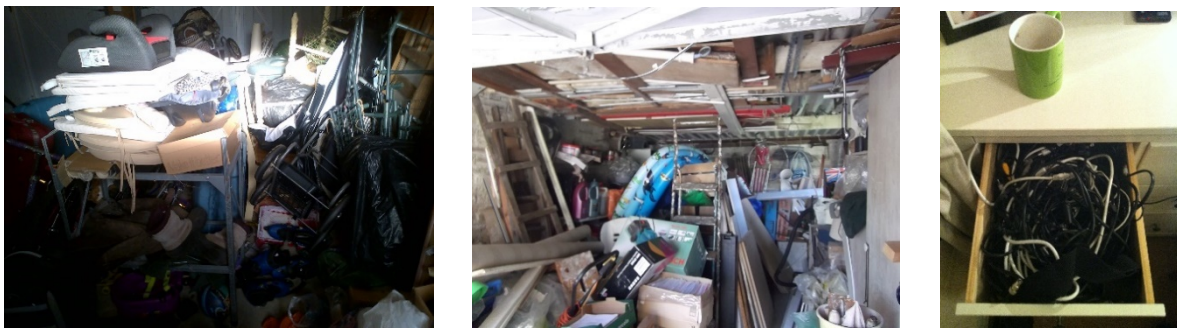

Figure 9 Material possessions that are rarely shown

Figure 10 Material possessions on display

While one of the limitations of using such an exploratory design research methodology is that the findings from this research are not generalizable, they nevertheless have positive implications for architects. The collected data created a richer and deeper understanding that can be used when designing, and especially when there is a desire to consider the user experience when designing for a home. This part of the study has advanced knowledge on the subject of housing design from the user's perspective, as well as contributing to the advancement of the exploratory research methodology itself.

This public participatory exhibition was selected through a peer-review process, and was held at the Architecture Centre, Bristol, from the 4th March to the 18th April 2014. The exhibition was a component of a project part funded by EPSRC (under a Bridging the Gaps grant to foster interdisciplinary research), and by a UWE internal grant (Vice-Chancellor Award). The author was the PI of the project, was responsible for its intellectual development, and for the organisation and design of the exhibition and the collection of all the data.

3.4 Learnings from the Substantive Analysis

The continuously changing participatory public exhibition presented a growing collection of photographs of the *'stuff"* that people have in their homes. The exhibition conveyed a glimpse into a domestic reality where the home is portrayed as a *'container'* and the household contents, the stuff, as the *'contained'*. The domestic reality of today's houses was unveiled, allowing the identification of how material possessions and storage practices have impacted (positively or negatively) on the use and experience of the home. For example, some of the photographs showed special and valuable personal collections that people wanted to display in their homes for others to see (Figure 27). Other photographs showed rooms, especially garages, under-stairs cupboards and attics, inundated with material possessions that are no longer used (Figure 28). The inhabitants participating in this exhibition had to make a conscious decision as to how much of their hidden reality they wanted to expose for the general public to see. The researcher understood that the participants were not objective recorders, but subjective ones. For example, one photograph submitted to the exhibition had to be later withdrawn, as the wife of the participant did not want that part of their *'messy'* house on public display.

The exhibition itself became the design element within the research (*design research*). It was constructed around a standardised box frame, like the utilitarian IKEA boxes that aim to apply order to the chaos of our possessions. The photographs became the tool through which the participants expressed their perceptions of the everyday collections of *'stuff'* and their impact on the physical spaces of their homes. The participatory exhibition also became a *'place-event'*, during which the research narrative was augmented through an *'ethnographic representation',* where *'ethnographic learning'* was gained (Pink 2009).

Members of the general public, being both photographer and participant, became the protagonists that helped reveal a truly hidden reality of the architectural space of the home through this interactive design event.

Using an auto-photography method (see Section 9.4.2), participants were given the freedom to select particular domestic spaces and to decide what they considered to be their *'stuff'*. This freedom was critical in unveiling the hidden reality of the impact of material possessions in today's houses.

The exhibition became a piece that transformed itself visually as more photographs were added and the domestic reality was unveiled. Whilst the exhibition also generated significant commentary and discussion from visitors, social media and local press, only the photographs were thematically analysed as part of this research. In hindsight, it might have been beneficial to include a record of the discussions that the exhibition evoked amongst those visiting, by analysing the e-mails accompanying photographic submissions and the social media comments. However, these sources were not designed as part of the data collection method, discussions were not recorded systematically, attendees had not given informed consent and as a result there was no ethical approval in place. Therefore, this additional layer of analysis could not be included in the research, but would undoubtedly have brought more richness into the visual / sensory ethnography.

This continuously changing exhibition enabled the identification of six concrete categories of *'stuff'* in the totality of the home, and gave an insight into where people keep their *'stuff'* and the extent to which material possessions were taking over the spaces in rooms, thereby adding to the body of knowledge on housing design. At the same time, a *literature review of contemporary sources* was conducted to aid the development of the conceptual framework of material possessions (Output #4). The six concrete categories began to validate what the literature review was identifying, and were therefore used to develop the examples given as part of the conceptual framework developed in Output#4. The photographs collected as part of the exhibition were also used to construct the collages used as part of the design event (Output #3) to test and refine the visual / sensory ethnography research methodology in the remainder in the DPhil.

4 Output #3: Undressing UK Housing

In order to capture the historical changes (Output #1) and the present qualities (Output #2) of today's domestic space, in both the physical space of the home, and in the use and experience of the space itself, the '*Undressing UK Housing'* ***architectural model*** was constructed to bring together past and present qualities of the domestic space. This model addressed research Sub-questions 1 and 2, as well as Objectives 1 and 2 (see Part B Chapter 8).

The architectural model created as part of the design research methodology visually abstracted the findings of the DPhil to date. The model was intended to be used as the key *architectural probe* for the next stage of the DPhil (Output #5). However, the size, fragility and aesthetics of the model led to the researcher to reflect on whether this was the right *architectural probe.* At the same time, the *literature review of contemporary sources* had been completed, in preparation for the development of the conceptual framework (Output #4). The literature review also suggested that the inductive and interpretivist methodological approach needed to be tested, in order to have confidence that the architectural model was the right probe for the next stage of the DPhil.

This led to the design of a *reflective participatory event* with five field experts to incite a reflective conversation. The *reflective participatory event* followed a visual / sensory ethnographic methodology to gain '*ethnographic learning'* (Pink, 2009). It placed the model, the architectural probe, in a kitchen: the '*place-event'*. The kitchen became the domestic context of the '*sensory home'* (Pink, 2009) that instigated a conversation that strengthened the dichotomy between the reality of space (the kitchen) and its abstraction (the architectural model), augmenting the research narrative that had been created. The field experts reflected on their own home experiences, bringing another rich dimension into the analysis of the research. The event tested the effectiveness of the reflective, exploratory, experimental and experiential visual / sensory ethnographic approach and enabled decisions on how this approach should be taken forward to the next stage of the DPhil. Therefore, the contribution of this Output is primarily methodological, even though the personal conversations with the participants added to the

richness of data related to the personal experiences of the inhabitants. The testing of this methodological approach was published as a ***peer-reviewed journal paper.***

4.1 Data Collection and Research Methodologies

The model used the data collected from the *literature review* and *exhibition* (Output #1 and Output #2). The creation of the model itself was carried out using a *design research methodology*. However, the finished model was then used to test and refine the *visual / sensory ethnography methodology* through a *design event (participatory research method)*, improving its appropriateness for the research in the remainder of the DPhil (see Sections 9.3 and 9.4).

4.2 Key Findings and Importance of the Work

The design and construction of the model was inspired by two historic events: the Smithsons' '*Design for the Future Home*'; and Andre Jaques' *'IKEA Disobedient'* (Van Den Heuvel and Risselada, 2004; Jaque, 2011; Godfrey, Chimmel, and Todoli, 2014). These events have been hugely influential in testing approaches to housing design, and have shown how users of domestic space could be engaged in a discussion about the ideas presented, changing their attitudes and preconceptions. These investigations of the use and experience of domestic space, explored through prototype models with consumers as participant-observers, are the foundations on which the model was constructed as part of this DPhil. The representation of design thinking as part of the making of architecture is the most important operation that articulates theory and practice (Dunn, 2007). The model is the medium by which *'certain relevant characteristics of the observed reality'* (Echenique, 1972) are enhanced and abstracted. When creating the model, it was necessary to be highly selective of the information that it contained (Dunn, 2007). It is left to the maker, (in this case the author), to identify the relevant features for abstraction.

The architectural model had to articulate the narrative of the DPhil and depict the qualities of domestic space in relation to the accumulation of material possessions, as well as the changes to domestic space over time. Titled *'Undressing UK Housing'*, it articulated what lies behind the

public face of the desired house through time. The model used historical and current information from two distinct phases of the DPhil. Firstly, it used the historical information collected as part of the overarching study exploring the major changes in UK housing over the last 200 hundred years (see Output #1). Secondly, it used an analysis of the two-hundred and thirty-four photographs that were collected as part of the participatory exhibition at the Architecture Centre, Bristol (see Output #2).

The model takes the form of the four most common terraced typologies: the Regency, Edwardian, Victorian and the Modern house. Each period has been deconstructed into twelve layers, each made of 5mm thick laser-cut acrylic, and each layer has been divided into two halves: left and right (see top-middle of Figure 11). One half of each layer has been carefully laser-etched to represent the past. The other half has been collaged, using images from catalogues and magazines printed onto acetate and glued onto the acrylic, to represent a more contemporary domestic space (Figure 12). These carefully constructed collages were designed using the findings from the analysis of the photographs collected though the participatory exhibition (see Output #2). The past (etching) and the present (collage) cohabit the architectural model to illustrate their influence on today's domestic spaces. Colourful contemporary collages collide with ghostly etched acrylic to communicate a reality of the everyday at a given point in time. The combined collection of models gives an overview across time and space, with the static physical framework of each period home contrasting with the dynamic array of objects and activities that they contain.

Figure 11 'Undressing UK Housing', Marco, E. (2016) – Photos reproduced with permission © Justine Frost

Figure 12 Example of the fabricated collages created from the collected photographs

The model was then used to refine and test the DPhil methodology through a reflective dialogue event with five key field experts (see Section 9.4.3). The model was placed in a specific domestic environment, the kitchen, in order to create a *'place-event'*, where the research narrative could be enhanced (Pink, 2009) and the dichotomy between the reality of space and its abstraction strengthened. From the reflective dialogue that took place, both the model and the collages were viewed as carefully constructed spaces that record and store the progress of the DPhil, showcasing how the project had developed, and communicating the research findings so far, in an abstract way.

The dichotomy between the '*perfect architectural model*' and the '*imperfect reality'* was a theme that emerged during the dialogue, especially within architecture and architectural-photography contexts. When architecture is photographed, people and stuff are usually removed, '*but the house is brought to life when you add these things'*. The participants debated whether, since the research investigated material possessions, this model was *'too legitimate'*, by which they meant too perfect or crafted. They concluded that the research needed an '*illegitimate model (or probe) that rebukes architectural space'*. The field experts concluded that a different type of visual probe was needed, where the *'illegitimate'* elements of the research were expressed. They felt that this would be of

more benefit to the visual /sensory ethnography methodology, since then people would not be afraid to touch it, move it, use it and even change it, as part of the dialogue.

4.3 Originality and Contribution to Knowledge

The architectural model allowed an exploration of its effectiveness as a means of implementing a sensory / visual ethnography research methodology. The very act of creating the model also required the processing and rationalisation of the findings of previous stages of the DPhil, through critical reflection. The model helped to synthesise information from disparate sources and provided a visual representation of that information. It also tested the DPhil research methodology through a reflective dialogue event, which identified the types of probes that would benefit the research and highlighted the importance of creating a *'taxonomy of stuff'*. The architectural model was effective as a means of implementing a sensory /visual ethnography, and brought a methodological contribution to knowledge of how architectural probes should be designed and constructed to test research findings with architects.

The photographic record of the model, taken during and after the event, was also considered an important part of the methodology, since it helped to promote dialog. This is something that was already considered by the Smithsons back in the 1950s (Van Den Heuvel and Risselada, 2014; Godfrey, Chimmel, and Todoli, 2014). The models were highly aesthetic, and the photographer wanted to stay truthful to this aesthetic and ensure that the images captured the essence of both the research project and analysis (see Appendix C).

The model itself served as a means of communicating the research findings to others, through two peer-reviewed exhibitions, one during a Design Research Symposium at UWE, Bristol, in May 2016, and the other at the Architecture Centre, Bristol, in July 2016. The collaboration between the author and the photographer was also published on the UWE Bristol Photography Research Group website 'IN FOCUS Collaborations' (see Figure 13 and https://bristolphotographyresearchgroup.com/photography-and-a-3d-model-in-an-architectural-conversation/). The author was responsible for the intellectual development of the

model and worked with two technicians that helped with the construction of the acrylic layers. The testing of this methodological approach was then written up by the author, and published in *The Design Journal*, under the supervision of co-authors Williams, Oliveira and Sinnett.

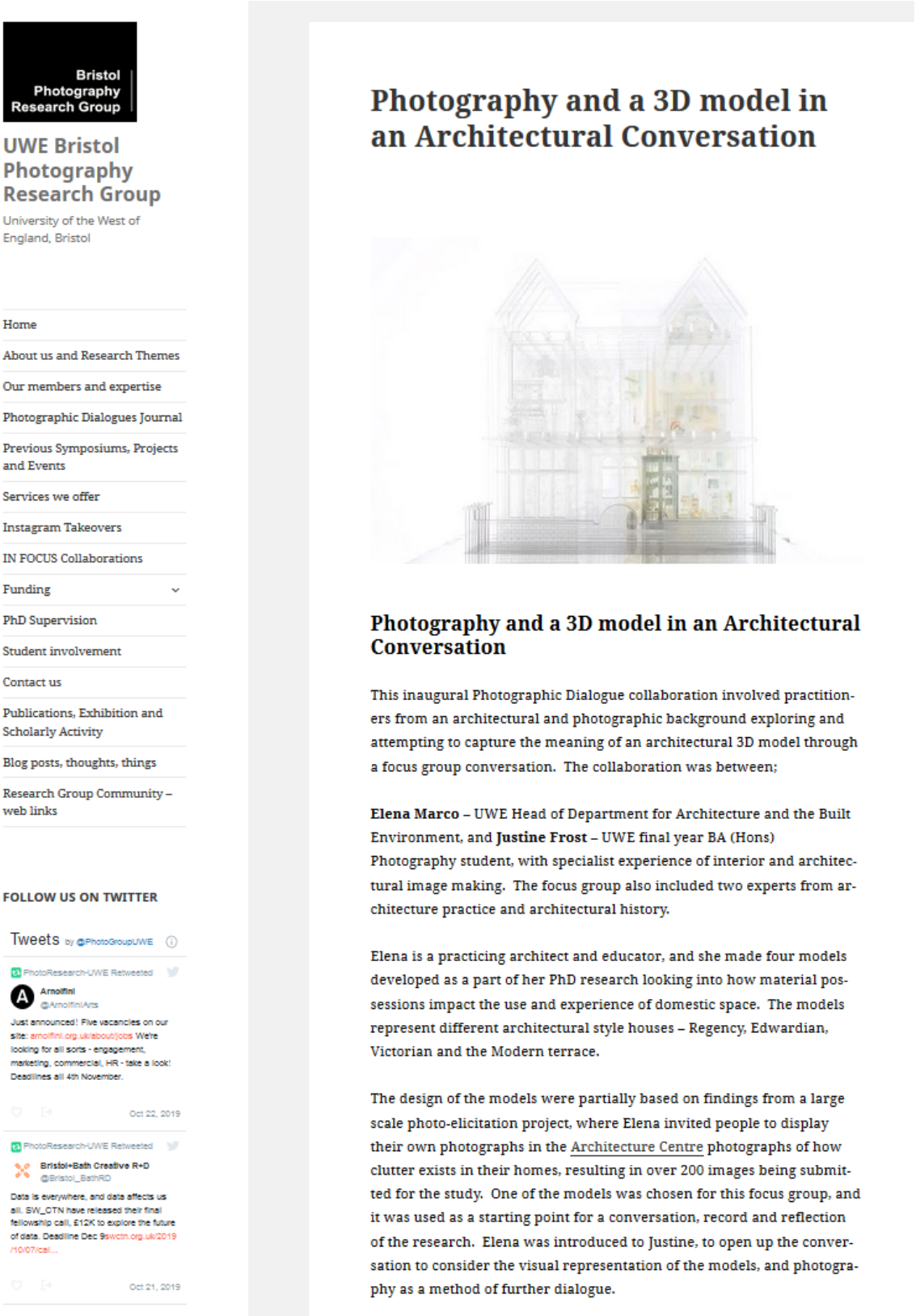

Figure 13 Photography research group collaboration

4.4 Learnings from the Substantive Analysis

The willingness of the author to expose the research to criticism at this early stage was seen by the participants as extremely brave. Nevertheless, by doing so, the researcher was able to generate new knowledge and give more rigour to the research. This reflective event was effective in testing the methodology and gave timely confidence and clarity that enabled the researcher to refine the *visual / sensory methodological approach* that was used in the final stage of the DPhil.

The idea of using architectural tools such as models and collages was seen as a beneficial means of continually updating and archiving the findings of the DPhil. Since the research topic is the accumulation and storage of material possessions, it seemed particularly apt to use an architectural model itself as a way of accumulating and storing the research findings. Not only did this allow the progression of the research to be visually recorded (*design research*), but the very nature of creating the model required the researcher to process and rationalise the findings through critical reflection.

One further key lesson from this process for the next stage of the DPhil was clarity on the type of '*architectural probe'* that would be appropriate for the final participatory event with practising architects (Output #5). It became clear that the probe had to be touched, moved and used as part of the research and not seen as too precious. Output #2 also suggested that a *'taxonomy of stuff'* was needed, which led to the development of the contextual framework of material possessions in Output #4.

5 Output #4: Too Much 'Stuff' and the Wrong Space: A Conceptual Framework of Material Possessions

Building on the importance of a *'taxonomy of stuff'* that emerged from Outputs #2 and #3, the next stage of the DPhil focused on the development of a new conceptualisation of material possessions in the form of a conceptual framework of material possessions that identified new universal characteristics and categories of material possessions, to stimulate new housing design approaches focused on storage for material possessions. This framework addressed research Sub-question 2, as well as Objectives 2, 3 and 4 (see Part B Chapter 8). A ***peer-reviewed journal paper*** was published, where, for the first time, the sociological, anthropological and consumer research literature (Csikszentmihalyi and Rochberg-Halton, 1981; Kamptner, 1989; Dittmar,1991; Richins,1994; Hand, Shove and Southerton, 2007) were brought together, to develop this new conceptual framework of material possessions to be used in housing design thinking.

5.1 Data Collection and Research Methodologies

The paper used a *literature review* as its main data collection method, as part of both *design research* and *sensory/visual ethnography* methodologies. By identifying key characteristics (qualities) and categories (set of shared qualities) of material possessions, the paper explored a new approach to housing design, where the impact of material possessions on the physical space of the home was considered (see Sections 9.3 and 9.4).

5.2 Key Findings and Importance of the Work

The conceptual framework of material possessions, summarised in Figure 14, identifies *value*, *temporality* and *visibility* as core characteristics that drive the categorisation of material possessions into *utilitarian* and *pleasurable* possessions, or possessions that shape the *inner-* and / or *external-self*. While the utilitarian and pleasurable possessions are part of short-, medium- or long-term cycles (frequency), material possessions related to identity are more sensitive to unidirectional

flows of time, be they *'life flows'*, *'emotional flows'* or *'lifestyles flows'*. Finally, depending on the sentimental, financial or aspirational *value* placed on the material possessions by the inhabitants, some items will be *visible* to themselves and others, and some will be *hidden* away from view. Strategies for the design of storage, at room- and house-level, were also articulated.

Space for living in new build houses in the UK is at premium and households have more material possessions (or *'stuff'*) than ever before. The way in which this 'stuff' is accommodated in dwellings can significantly affect residents' quality of life and well-being. Therefore, by using this framework, architects, policy makers and even house builders, could evaluate and adopt a new approach to housing design that considers the implications for storage in homes, especially when space is at a premium. The impact of material possessions on the physical space of the home, as well as the location of storage for these material possessions, is presented as a new perspective for consideration in the housing debate.

The study places value on the design of storage within the limited space of todays' houses, in order to propose an alternative approach to housing design thinking that provides adequate spaces for the inhabitants and their associated material possessions. These possessions define the inhabitants' values and self-identity and affect their well-being, comfort and happiness. Therefore, it is argued that storage practices should be brought to the forefront of housing design thinking. By including storage in the designers' agenda, architects can begin to consider material possessions related to the inner and external-self, so the design of houses can truly facilitate the inhabitant's lives and lifestyles: a perspective that until now has not been considered in published design guides.

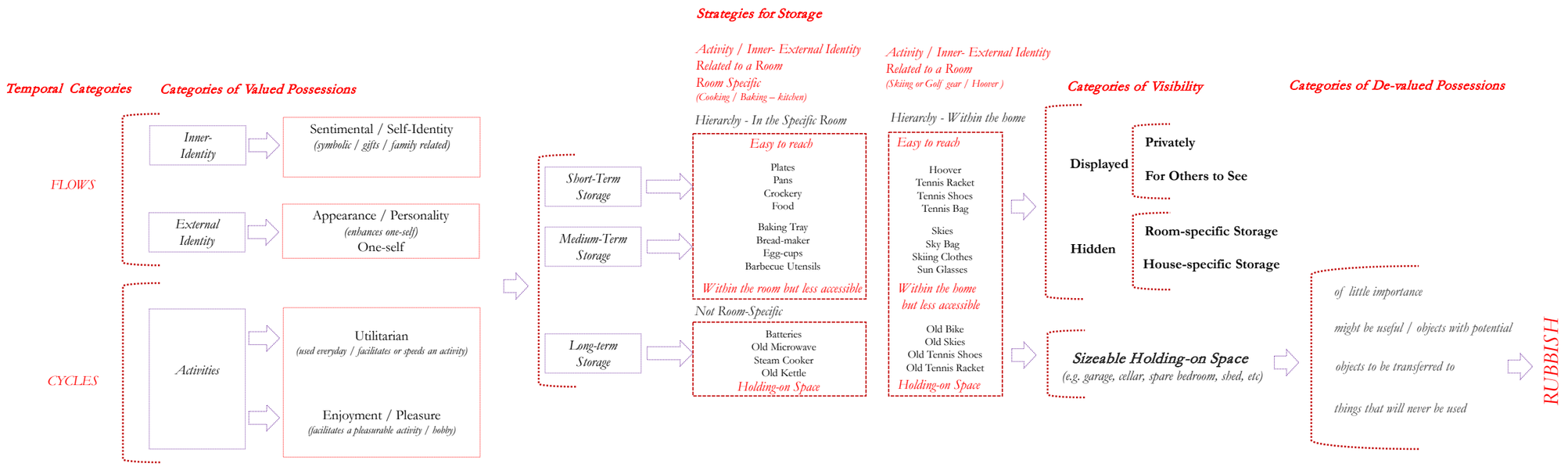

Figure 14 A conceptual framework of material possessions

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5.3 Originality and Contribution to Knowledge

The paper (Output #4) presents a new conceptualisation of material possessions that draws primarily on literature from sociology, anthropology and material culture. This is developed into a framework that presents a new characterisation and categorisation of material possessions, to be used to think about the space in the home that possessions might require. The conceptual framework then integrates these characteristics with spatial information about the home, in the form of strategies for storage at room and house level.

This study stimulates new housing design approaches, focused on storage for material possessions related to activities, inner- or external- self, either at room- or house-level. It argues that the conceptual framework could help designers, policy makers and house builders to better understand the nature of material possessions, and how those possessions could be better accommodated in contemporary homes. Considering space for storage in the design of new houses could help householders avoid cluttering the space, and therefore impact positively on their quality of life and well-being.

The conceptual framework presented here also begins to address the weakening functionality of the new houses that are currently being built, at a time when the delivery of new housing is a priority. The contribution to the DPhil of this part of the study is primarily theoretical.

The peer-reviewed journal paper is published in *Interiority*, authored by Marco and co-authored by Williams and Oliveira. Marco undertook the literature review, developed the conceptual framework and wrote the paper, under the supervision of Williams and Oliveira.

5.4 Learnings from the Substantive Analysis

For the first time in the field of architecture, literature from the sociological, anthropological and consumer research fields has been brought together to develop a conceptualisation of material possessions in the form of a new conceptual framework for housing design thinking. The architectural research field lacks detailed and experiential research into material possessions

and space. The research across these diverse fields was found to be critical to help develop the novel framework that abstracts, conceptualises and synthesises a complex body of literature to identify the characteristics and categories to be used specifically in design. The practitioner-researcher played a central analytical role in this process, as they need to be selective and critically identify which information is relevant and necessary for the purpose of design.

The framework articulated in the peer-reviewed journal was translated into four visual architectural diagrams that capture the core characteristics and associated categories of material possessions. The value, temporal, visibility and storage-strategies probe diagrams together form the *'architectural probes'* to be used in the final stage of the DPhil to stimulate new housing design approaches focused on storage for material possessions.

The framework was validated by the six categories of '*stuff*' that were identified in Output #2. The itemisation that took place during the analysis of Output #2 was used to generate the examples that the four framework diagrams capture. These examples are used to exemplify each characteristic and category of possessions, and to articulate the *'taxonomy of stuff'* that Output #3 had identified as beneficial for the next stage of the research.

As with Outputs #1, #2 and #3, the use of architectural tools (diagrams, collages, photographs, models, timelines, mind-diagrams, etc.) was also critical in helping visualise, analyse, synthesise and communicate the complexity and multi-dimensionality of the research process and its findings.

6 Output #5: Prioritising Storage Practices: A New Approach to Housing Design Thinking

The final stage of the DPhil engaged with seventeen practising architects to test the conceptual framework developed from the previous Outputs and the literature, and to elaborate on the characteristics and categories identified. The results have been published in a third ***peer-reviewed journal paper*** that addresses research Sub-question 3 and Objectives 5 and 6 (see Part B Chapter 8).

6.1 Data Collection and Research Methodologies

The research associated with this final stage of the study took the form of discussions and a design intervention with seventeen practising architects that work with house builders. The sample of architects ranged from small, medium and large architectural practices, and represented a range of positions, so that an array of perspectives could be captured. Initially, the discussion identified how architects approach the design of standardised house types, and whether the design of storage is considered at all, and if so, how (present). The study employed a *visual architectural design probe* data collection method, using four carefully designed diagrams (value diagram, temporal diagram, visibility diagram and a storage strategy diagram) informed by Output #3. These probes captured the authors' conceptual design framework of material possessions developed from anthropological, sociological and consumer research fields (Output #4), and were synthesised with the examples gathered from Output #2. Using a dominant *visual / sensory ethnography* research methodology (see Sections 9.3 and 9.4), the probes *(design research)* were then used to explore how storage practices could be better incorporated when designing new homes (future).

6.2 Key Findings and Importance of the Work

Methodologically, the visual design probes stimulated dialog and design thinking amongst the practising architects from the particular perspective of storage practices for material

possessions. By exploring new approaches to housing design thinking from a storage perspective, the architects were able to propose designs that support the inhabitants' lives and lifestyles, and therefore their wellbeing.

In the subject domain, the findings of the study show that a consideration of storage and its associated practices is vital for good housing design. In order for new models of housing to emerge, that consider inhabitants' material possessions, space for storage needs to be valued and not seen simply as residual, leftover space. In current housing design, space for storage has been eroded to accommodate the ever-increasing number of *'must have'* rooms. Rooms currently add value to a house, whilst space for living and storage does not. When the study participants were asked to design for storage, their approach was sometimes to do so in a way that created a valued *'room'* in the form of a *'wall of storage'* or a *'central house storage'*. Some participants also tried to bring back traditional residual spaces like the *'loft'* or the *'under stairs cupboard'*. This meant that the storage became a valued dedicated space in itself, one that could be costed-in and marketed by the developers. Creating a valued room, that is seen as a *'must have'* so it sells, was seen as a way to challenge the static developers' portfolios.

Some of the innovative approaches to housing design provided by the participants challenged the idea of *'must have'* rooms. They were driven by flexibility and adaptability as well as inhabitant's house profiles. For example, the idea of an *'expandable and contractible attic space'* was explored by two participants, to accommodate long term possessions. The idea of a *'blanket house'* also emerged, that not only considered internal storage, but also external (e.g. bikes, bins, garden tools, maintenance tools, etc.), indicating the importance of a *'layered approach to storage',* where external storage was valued as much as internal. The architects suggested that storage needs to be a valuable space and to become more glamorous, inspirational and experiential.

6.3 Originality and Contribution to Knowledge

For the first time, this study has brought storage practices to the centre of standardised housing design. By using a new approach to housing design thinking, in the form of a conceptual

framework of material possessions as an architectural design probe, practising architects were engaged in a design intervention to explore how to design for storage when space is at a premium.

The strength of the study lies in bringing together two widely acknowledged problems: the housing crisis and the growing preoccupation with the acquisition of material possessions. The design proposals that emerged from the study reinforced previous studies, where flexibility was identified as critical (Schneider and Till, 2005; Wigglesworth, 2019). However, the study also brought a new unexplored dimension to design practice research and housing policy debates. It went beyond providing space for living, and considered the impact that material possessions have on the physical space of the home, supporting resident's lives, values, lifestyles and well-being.

The exploratory nature of the study sought new design insights, by using an innovative design method using visual probes with practising architects. The development of the six stages of the ethnographic method followed the approach proposed by Wallace et al. (2013). However, instead of being used with participants that have gone through a lived experience (in this context, it would have been the inhabitants), it was used with the architects themselves (the professionals that need to understand the inhabitants), to enact a much richer and focused dialog and design response. The study demonstrated, for the first time, how a small number of practising architects engaging in an exploration of design for storage could produce new knowledge for the design of a future standardised house type, using a dynamic and reflective research method. This part of the study also contributed to knowledge through its empirical findings on the subject of housing design, as well as its theoretical contribution by testing the framework developed from the literature (Output #4).

While the focus of the study has been on UK housing, its method could be applied more widely to any context where design practitioners are engaged in developing new knowledge to inform the practical implementation of original design solutions.

The peer-reviewed journal paper is published in *Interiority*, authored by Marco and co-authored by Williams and Oliveira. Marco undertook the literature review, developed the visual design probes, conducted the interviews with practising architects and wrote the paper, under the supervision of Williams and Oliveira.

6.4 Learnings from the Substantive Analysis

This final stage of the DPhil was more focused than those that came before. It engaged practicing architects in a design event to test the effectiveness of the conceptual framework of material possessions in practice. By using a reflective and dynamic research method, architects were challenged to approach the design of standardised houses from a new perspective, that of storage. By using the conceptual framework of material possessions as an *architectural probe* in the form of four carefully constructed diagrams, the architects were able to generate novel and focused approaches to storage design in housing. The focus of the event was the smallest unit, the standardised house type, to challenge the static developers' portfolios that have an increasing number of must-have rooms, eroding space for storage.

The probes became the catalysts to remind the participants that real people with a variety of material possessions will be living in the standardised houses they design, and therefore the issue of storage should not be ignored. It made them reflect on their own personal experiences as inhabitants of houses, and they attempted to bring back these eroded spaces for storage when articulating their proposals. The framework made them unpick an area of housing design thinking that they had not considered in that level of detail before, since they began to approach the problem as inhabitants themselves, not just as architects.

Not only did Output #5 demonstrate that practising architects found the storage-focused conceptual framework from Output #4 an effective prompt to remind them that real people with material possessions will be living in standardised houses. It also produced new empirical knowledge of how storage can be included in housing design, avoiding cluttering spaces and impacting positively on the quality of life and well-being of the inhabitants.

The participants articulated how rooms add value to the house, whereas space for activities and storage does not. Their design solutions became *'common-sense'* proposals, that created a *'valued'* room in the form of *'wall of storage'* or a *'central house storage'*. Flexibility became a critical design dimension that could also be generalised, and this finding reinforced previous studies (Schneider and Till, 2007; Wigglesworth, 2019). Some of the innovative approaches to housing design provided by the participants challenged the idea of *'must have'* rooms. They were driven by flexibility and adaptability as well as household profiles. For example, the idea of an *'expandable and contractible attic space'* was explored by two participants, to accommodate long-term possessions. The idea of a *'blanket house'* also emerged, that considered external storage (e.g. bikes, bins, garden tools, maintenance tools, etc.) as well as internal storage, indicating the importance of a *'layered approach to storage',* where external storage was valued as much as internal. This demonstrates that better houses can be designed if the nature of the material possessions and space are fully understood.

Furthermore, the diagrammatic records of these design proposals present another '*ethnographic record*' (Pink, 2009) from the architects themselves, capturing the '*visual ethnography of a design process'* that feeds into the '*visual ethnography of the design research process',* the DPhil in itself.

The research study presented through the five Outputs of the DPhil has ambitiously and creatively explored how UK houses can be better designed by better understanding the nature of *'stuff'* and space. Across the whole study, architectural tools (diagrams, collages, models, photographs, timelines, mind-maps, etc.) are used as *'ethnographic records'* (Pink, 2009) to evaluate, correct and re-evaluate the research process in itself.

Output #1 captured the historical evolution of domestic space over time (the past), Output #2 brought a new perspective on the ordinary by exposing the impact that material possessions are having on today's houses (the present). Output #3 enabled a re-evaluation of the methodological research approach and identification of the next *'architectural probe'* to be used in

a focused design intervention, via the four diagrams capturing the conceptual framework of material possessions (Output #4). The strength of Output #5 lies in bringing together two widely acknowledged problems, the housing problem and the growing preoccupation with the acquisition of material possessions, to be explored in a design event with architects. The findings of Output #5 brought a new unexplored dimension to design practice research and housing policy debate, that of going beyond providing space for living and considering the impact that material possessions have in the physical space of the home in supporting the resident's lives and lifestyles and therefore their well-being. The resulting design proposals show that by better understanding the nature of material possessions and the impact on space, better housing models can emerge. This study values storage and advocates for flexibility, proposing new models of housing that address the well-being and health implications associated with the cluttering of space. However, these models cannot ignore the viability and affordability of housing, especially when addressing standardised house types. Real people will end up living in these standardised houses.

Part B – Research Context, Questions, Methods and Conclusions

Part B presents a critical commentary on the peer-reviewed body of work that comprises the DPhil. It describes the research context in which the study is situated, identifies the research questions and objectives, shows the overarching methodology used in the study, and concludes by identifying the findings and overall contribution to knowledge across three domains: methodological, theoretical and subject based. It finishes with some reflections on the research process, the limitations of the research and suggestions for further enquiry.

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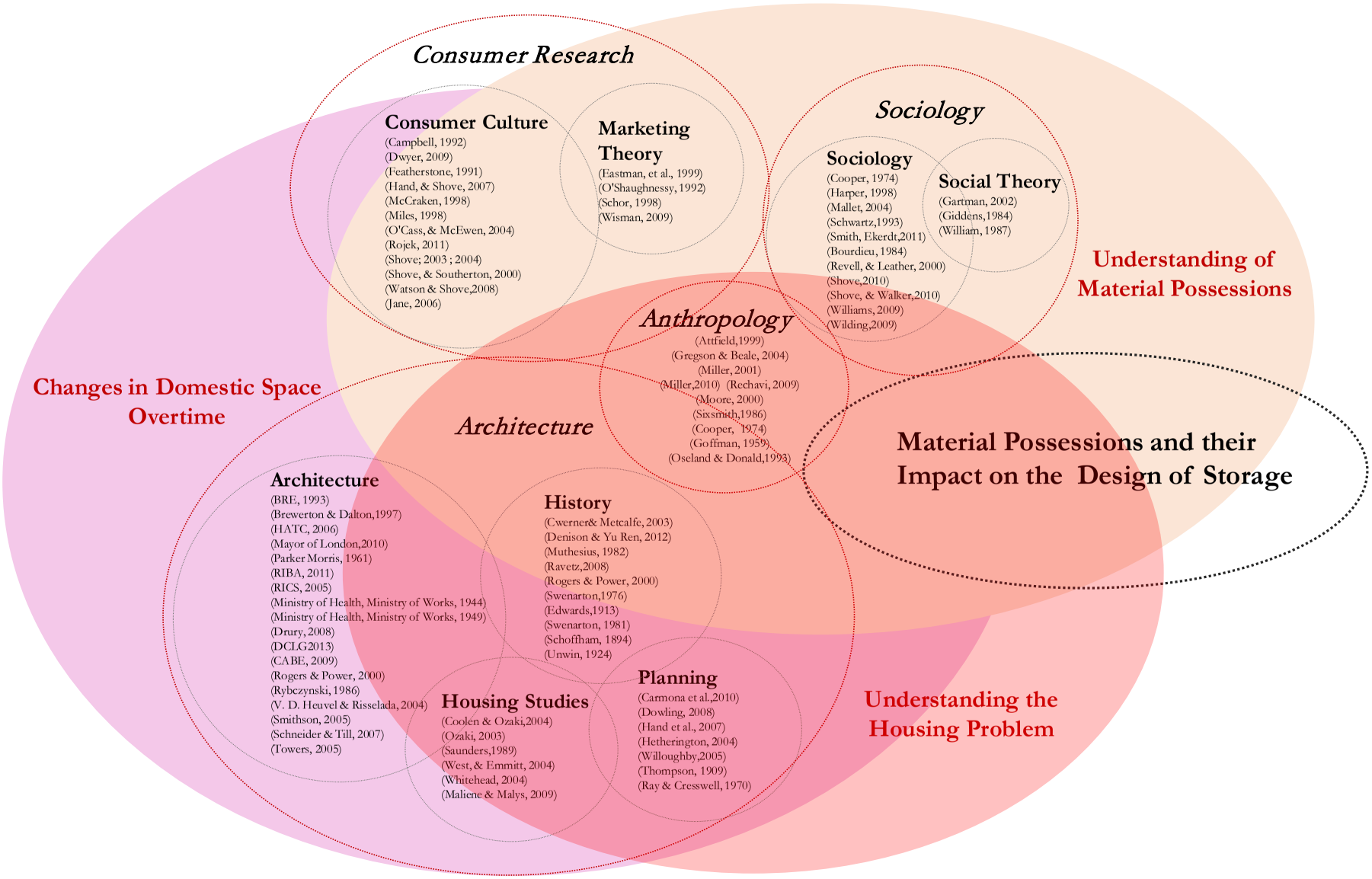
7 Research Context

This Chapter contains a short literature review of key sources that set the context of the study and gives definitions of the key terms used. This review draws on literature from four core fields: architecture (including planning), sociology, anthropology and consumer research (including material culture), in order to identify gaps in current knowledge and to aid the development of a number of research questions. It also makes new connections across these fields, in order to deliver new knowledge in the field of architectural research and practice (Denzin and Lincoln, 2008; Noy, 2008). Figure 15 shows how the study sits within the context of existing literature.

7.1 Context of the Study

The UK is currently at the centre of a national housing crisis, in terms of the number of units available, their speed of delivery and their viability (DCLG, 2017a; Wilson and Barton, 2018). The viability of housing has had an impact on the space provided for living, and also that for storage. Since the removal of the Parker Morris (MHLG , 1961) standards in 1980, the UK has not had mandatory space standards (Park, 2017). Many organisations (BRE, 1993; Brewerton and Dalton, 1997; NHF, 1998; CABE, 2004; 2005; 2009; HATC, 2006; Mayor of London, 2010; DCLG, 2015) have published best practice guidelines for housing design in order to address the space problem, and the UK now has National Described Space Standards (DCLG, 2015), but these are all optional. Even though these standards are not compulsory, their existence has led to some house-builders arguing that they will lead to increased build costs, and long-term difficulties for housing supply, since Local Plans could include the *'unjustified application of optional standards'* (Home Builders Federation, 2014).

Figure 15 Situating the research within fields of literature



The delivery of housing has changed drastically since the 1970s, and currently a very small number of large companies deliver the vast majority of new houses (Gillen, 1995; 1997; Ball, 1996a; 1996b; Nicol and Hooper, 1999). Whereas, in 2000, forty-three house builders were responsible for almost 71% of all houses built in the UK (Wellings, 2001; Addams, 2004), now only eight of the largest builders are responsible for more than 50% of new homes (House of Commons, 2017). Furthermore, in the last 15 years approximately 80% of all new housing has been provided by speculative house builders (Hopper and Nicol, 2000; Adams, 2004). Such developers tend to use specific housing portfolios with particular house layouts, developed principally from feedback received by sales and marketing departments. These layouts are repeated in different developments and used across the country. Hopper and Nicol (2000) state that house builders often do not create new designs, but use incremental modifications to their existing portfolio types, which lack design innovation; especially in the small (two- and three-bedroom) houses.

Despite being criticised for building homes that do not provide enough space for basic activities or storage (Karn and Sheridan, 1994; CABE, 2005; 2009; RIBA, 2011; 2015; Madeddu, Gallent and Mace, 2015), house-builders across the UK have disputed the need for more space, and for regulated space standards (Madeddu, Gallent and Mace, 2015). Developers continue to reduce the size of houses to ensure drivers like profit margins, developments costs and housing demand are addressed (Williams, 2009; Mayor of London, 2010; Madeddu, Gallent and Mace, 2015). In addition, the UK uses the number of bedrooms to market houses or collect housing statistics (HATC, 2006; Williams, 2009; Mayor of London, 2010; Madeddu, Gallent and Mace, 2015), rather than using overall dimensions, floor areas, or the suitability of the physical configuration of space. As sizes can vary notably between houses with the same number of rooms, this leads to a deceptive impression of houses being bigger than they are (Williams, 2009). Moreover, with the modern desire for en-suite bathrooms, study rooms and utility areas, more rooms are being squeezed into the same footprint (DCLG, 2017b) and living room, kitchen, corridor and bathroom sizes have all reduced as a result (Madeddu, Gallent and Mace , 2015). Space in new

housing in the UK continues to be reduced (Williams, 2009; RIBA, 2011; Park, 2017) and space for living is at premium, with the functionality and liveability of homes being compromised (Madeddu, Gallent and Mace, 2015).

The evolution of domestic space over time has seen the demarcation between *'private'* and *'public'* space activities weakened, leading to boundaries of the spaces, historically demarcated, becoming blurred. This has led to new contemporary hybrid spaces, such as the kitchen-diner or open-plan living, being marketed as supporters of modern family life (Dowling, 2008). Open-plan rooms continue to influence housing design today, especially when considering notions of adaptability, flexibility, mobility and change (Attfield, 1999; Denison and Yu Ren, 2012). The literature shows that modern domestic spaces have evolved to become multi-functional and versatile, catering for an array of activities (Oseland and Donald, 1993; Hand, Shove and Southerton, 2007) but within smaller footprints.

In addition to houses being small, research has shown that the UK's homes also have inadequate storage provision (Karn and Sheridan, 1994; CABE, 2005; 2009; RIBA, 2011). In fact, storage is considered a key weakness of modern housing design (Mayor of London, 2010). Part of the problem is that space for storage is not highly valued by prospective house buyers. However, once new homes are occupied, inhabitants often report that there is not enough storage for their possessions (CABE, 2005; 2009), as the space has been reallocated to more marketable rooms. The Royal Institute of British Architects (RIBA) has identified how a lack of space in new homes can *'impact on the basic lifestyle needs that many people take for granted, such as having enough space to store possessions'* (RIBA, 2011, p.4). This study also found that 69% of people living in fully occupied homes felt they did not have enough storage space (RIBA, 2011).

Partly as a result of smaller homes, material possessions can overwhelm domestic spaces and affect the inhabitants' well-being, physical- and mental-health, security and comfort (Cwerner and Metcalfe, 2003; Shenk, Kuwahara and Zablotsky, 2004; Smith and Ekerdt, 2011; Roster, Ferrari, and Jurkat, 2016). Stress, insomnia and low mood are some of the consequences of

spaces being overloaded with *'stuff'* (Saxbe and Repetti, 2010; Raines et al., 2015). The accumulation of material possessions is having an impact on the physical space of the house and on space for storage (Hand, Shove and Southerton, 2007; Hirschman, Ruvio and Belk, 2012). For example, Arnold and Lang (2007) identified the change of use of spaces such as the garage, which are now being used as storage spaces to deal with the excess of material possessions. Hand, Shove and Southerton (2007) acknowledge that the current demand for more space can be linked to the accumulation of material possessions in the home. The inhabitants' lifestyles are supported by the material possessions that they accumulate during their lifetime, while the physical space of the house facilitates their lives at a specific moment in time (Miles, 1998; Smith and Ekerdt, 2011) (see Figure 16).

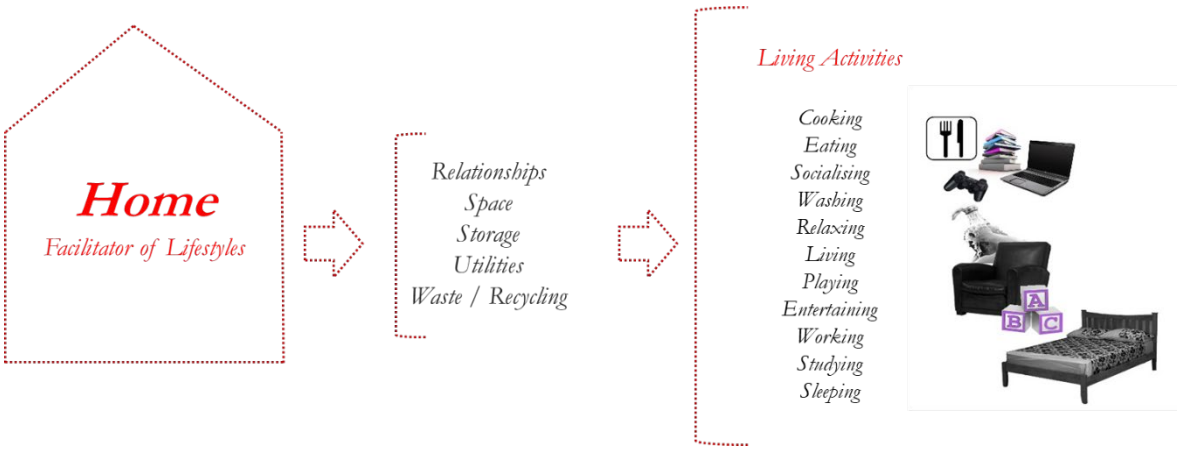


Figure 16 Home as a facilitator of lifestyles

The outputs from this study explore, in greater depth, changes in domestic space over time, and they identify the key role that material possessions have played in how people inhabit their homes. A significant body of research has been carried out on the acquisition of material possessions and the associated consumerism practices, as well as on the values and meanings associated with material possessions. Whilst the literature shows some categorisations in relation to the value placed on a possession at a specific time, that might make it be displayed or hidden away, until now, there has not been a conceptualisation of material possessions that could be of use to those involved in housing design. A key ambition of this study has been to identify

whether a better understanding of material possessions can help inform housing design thinking. To achieve this, new evidence was gathered on people's current use of space, and more importantly on how architects approach the spatial design of the home and its associated storage practices, especially in the smallest units: the standardised house types.

7.2 Definitions

This section sets out the definitions of *'house'*, *'household'*, *'inhabitants'*, *'storage'*, *'material possessions'*, *'stuff'* and *'clutter'* that are used in all the Outputs.

'House' within the context of this study is considered as the physical domestic space where a household lives and carries out a range of activities, either individually or as part of the household unit. This study covers a range of house types in Outputs #1, #2 and #3, whereas Outputs #4 and #5 focus solely on the *'Standardised House Type'*. This is the smallest range of units currently being built by house-builders. They have the minimum possible sizes of rooms and do not follow current optional space standards. These basic units are developed by house-builders to be used *'universally'* in their developments, so that costs can be minimised. This house type is typically designed to accommodate a *'standard'* range of furniture and kitchen and bathroom fittings, but not the myriad of material possessions that people need to accommodate.

The terms *'Household'* and *'Inhabitants'* are used interchangeably in the research. They are understood to be the people or family unit living in the physical domestic space. Households come in many shapes and sizes. They can range from a single person or a small family unit to multiple (unrelated) occupants of a shared house. The type of household has consciously been left undefined for the purpose of this research, as it is understood that, even when designing for a specific house type, the composition of the household occupying the same house can vary from house to house and over time.

'Storage', within the context of this study, is understood to be a fundamental dimension of householder's inter-personal relationships and lifestyles. It facilitates order, both physically and

mentally, and affects happiness and well-being (Cwerner, 2001; Cwerner and Metcalfe, 2003; Smith and Ekerdt, 2011). Storage comes in many different forms, from stand-alone units such as traditional shelving, cupboards, free standing wardrobes, boxes and racks, to structures that form part of the building itself, such as under-stairs cupboards, fitted wardrobes, attic rooms and sheds. Storage facilitates the classification, rationalisation and organisation of the material possessions within the physical space of the home (Cwerner, 2001).

'Material possessions' are understood to be the items and objects that make up the range of *'stuff'* and *'clutter'* (material possessions in a state of untidiness) that a person or a household accumulates through time, and has in their house. The definition does not include the large furniture items or kitchen and bathroom fittings that are usually included in the layout plans of new homes. The focus of this study is all the *'unplanned-for'* items, such as clothes, ornaments, cutlery, sports equipment, collections, photographs, etc., that are not considered during the design phase. This definition was arrived at after a wide-ranging literature review that identified bodies of work on the acquisition of material possessions and associated consumerism practices (Schor 1998; Eastman, Goldsmith, and Flynn, 1999; Gartman, 2002; Cwerner and Metcalfe, 2003; O'Cass and McEwen, 2004; Schor 2007; Wisman, 2009; Dwyer, 2009; Smith and Ekerdt, 2011; Rojek, 2011; Carr et al. 2012). The focus of research in this field to-date has been predominantly on the link between acquisition and social status, and has largely ignored the impact on the physical space of homes, and especially on storage. In the 1900s, Veblen (1967) introduced the concept of conspicuous consumption, by which one's material possessions demonstrate signs of affluence that need to be openly displayed (Carr et al. 2012) in order to *'keep up with the Joneses'* (Mason, 2000). The latest trends are craved, be they clothes, gadgets, appliances, tools, toys or furnishings (Schor, 1998; Carr et al. 2012). Consumerism practices lead to the acquisition of material possessions (Carr et al., 2012) to improve the social standing of individuals and households in relation to others (Stevenson, 2003; Jane, 2006). Normally, material possessions associated with acquisition are linked with the inhabitants' self-identity, personal values and biography (Belk, 1988; Richins and Dawson, 1992; Richins, 1994; Miles,

1998; Sutton, 2006; Pink, 2009). However, there are also practical material possessions (e.g. crockery, plates, glasses, cutlery, etc.), that are not necessarily associated with acquisition but necessity to carry out typical activities. Both these types of material possessions are included in this study.

In the literature, '*material possessions*', '*stuff*' and '*clutter*' have different connotations and meanings. Generally, *material possessions* are associated positively with inhabitants' self-identity, personal values, memories and biography (Belk, 1988; Richins and Dawson, 1992; Richins, 1994; Miles, 1998; Sutton, 2006; Pink, 2009; Miller, 2010). The use of the term '*material possessions'* within this study has been taken to suggest a more neutral association between the inhabitants and their possessions. In the literature, '*stuff*' is often used interchangeably with material possessions, but it is generally recognised as a less tangible term that can have problematic or pervasive connotations. For example, the seminal work of Miller (2010) makes a point of not defining *'stuff'* at all, as he sees it as a transient term. S*tuff* is a more loosely defined term within the literature, and also within this study. C*lutter* is in itself a term that consistently appears in the literature with negative, disruptive and even irritating connotations (Cwerner and Metcalfe, 2003), and this study follows the same approach.

7.3 Research Gap

There has been very little academic research in the field of architecture on how the growth in material possessions is impacting on living space in the home. *'Stuff'* that inhabitants own is also largely overlooked in current debates on housing policy and design. There is little understanding of what households own, collect, store and dispose of, nor the implications this might have for domestic space design, and especially for storage. Moreover, the location (of storage) for these growing possessions has been overlooked in the literature, not only in consumption theory research (Cwerner and Metcalfe, 2003), but also, and perhaps more importantly, in design best-practice guidelines (CABE, 2009; RIBA, 2011; DCLG, 2015). Morgan and Cruickshank (2014) also identified a lack of research on what is a suitable size for a house or specific room.

This study explores the historical changes in domestic space, and identifies the role that material possessions have played in how people inhabit their homes to identify themes and inform current spatial housing design thinking. It also examines cross-field literature to identify universal characteristics (qualities) and categories (set of shared qualities) of material possessions to be used in housing design. This enables a conceptualisation of material possessions to be developed, to generate a storage-focused characterisation and design framework for material possessions in the home. The research explores how houses are currently designed, tests the framework, and investigates ways in which houses can be better designed to consider the impact of these growing material possessions. It narrows down to focus on the smallest house units, the standardised house types, in the final two outputs (Outputs #4 and #5) to understand how the limited space they have available can be designed to ensure better storage provision.

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8 Research Question and Objectives

In order to be able to address the research gaps identified in the literature, the overarching research question of this study is:

How can an understanding of material possessions help to inform spatial storage design in UK housing?

The research answers this question by addressing three sub-questions:

1. How have material possessions influenced housing design over the last 200 years in the UK, and how have they affected the way people inhabit their homes?
2. What are the characteristics of today's material possessions, and how do they influence architects' approaches to the design of standardised house types?
3. To what extent can the answers to sub-questions 1 and 2 help to inform the spatial storage design of a standardised house type?

In order to address these sub-questions, the following principal objectives are set:

1. To understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change.
2. To identify the characteristics (qualities and quantities) of material possessions and storage practices in today's homes.
3. To examine how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home.
4. To generate a storage-focused characterisation and design framework for material possessions in the home.
5. To engage with practising architects to elaborate on these characteristics and storage practices, and to test the usefulness of the framework.
6. To generate new approaches to storage design in the most common standardised house type that could improve inhabitants' use and experience of the home.

These objectives, summarised in Figures 17 and 18, show the overall thesis design in context, so the reader can easily understand how each Output answers each sub-question, and situates the research in sequence to show how the overall research question is finally answered. The study is based on a number of publications, artefacts and visual research outputs, woven together to constitute the DPhil.

How can an understanding of material possessions help to inform spatial storage design in UK housing ?

Sub-Questions	*Objectives*
How have material possessions influenced home design over the last 200 years in the UK and how have they affected the way people inhabit their homes?	To understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change.
What are the characteristics of today's material possessions, and how do they influence architects approach to the design of standardised house types?	To identify the characteristics (qualities and quantities) of material possessions and storage practices in today's homes. To examine how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home. To generate a storage-focused characterisation and design framework for material possessions in the home. To engage with practising architects to elaborate on these characteristics and storage practices and to test the usefulness of the framework.
To what extent can the answers to questions 1 and 2 help to inform the spatial storage design of standardised house types?	To generate new approaches to storage design in the most common standardised house type that could improve inhabitants' use and experience of the home.

Figure 17 Research question, aims and objectives

Definition of Research Question

How can an understanding of material possessions help to inform spatial storage design in UK Housing?

Development of Research Sub-questions

1. How have material possessions influenced home design over the last 200 years in the UK and how have they affected the way people inhabit their homes?

2. What are the characteristics of today's material possessions, and how do they influence architect's approach to the design of standardised house types?

3. To what extent can the answers to questions 1 and 2 help to inform the spatial storage design of standardised house types?

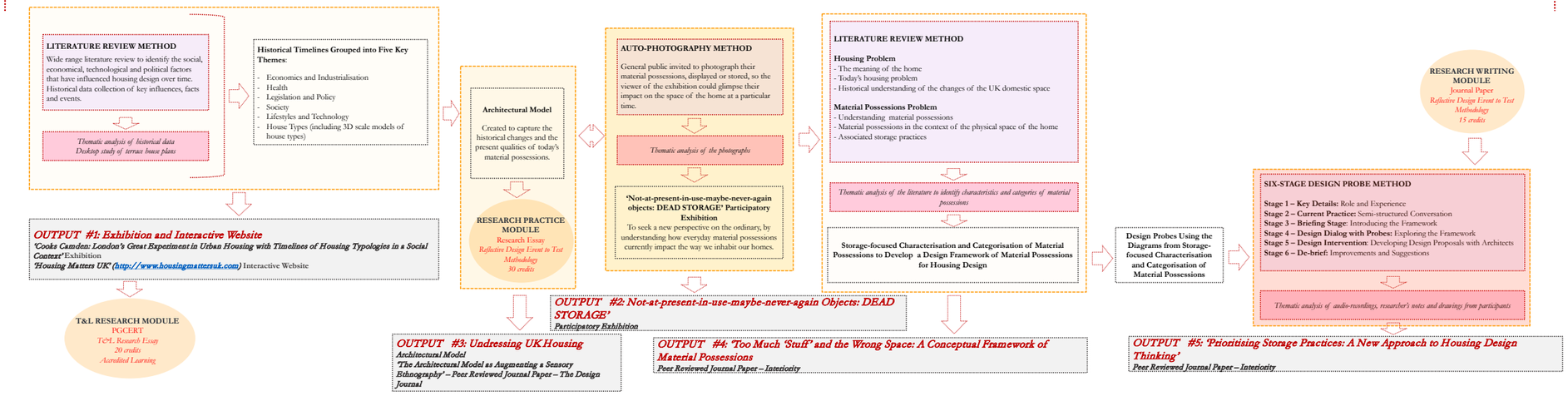

Figure 18 Overall research framework

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9 Research Methods

This Chapter focuses on how the research was designed and conducted. It sets out the design research methodology and methods, and explains the research enquiry.

9.1 Philosophy and Approach

Saunders, Lewis and Thornhill (2009) developed the *'onion'* model as a way to formulate an effective research methodology that starts with a clear research philosophy. By working from the outer to the inner layers of the onion, the researcher can trace the relationship between the philosophy and research approach, and explore how these influence the research strategy and methods. However, depending on the research questions proposed, the philosophical domains suggested by the onion model might not fit exactly, and in some cases might overlap. This is particularly likely when research is focused within an architectural or design field. In order to identify the appropriate research philosophy, Figure 19 positions this study within the Saunders, Lewis and Thornhill (2009) model.

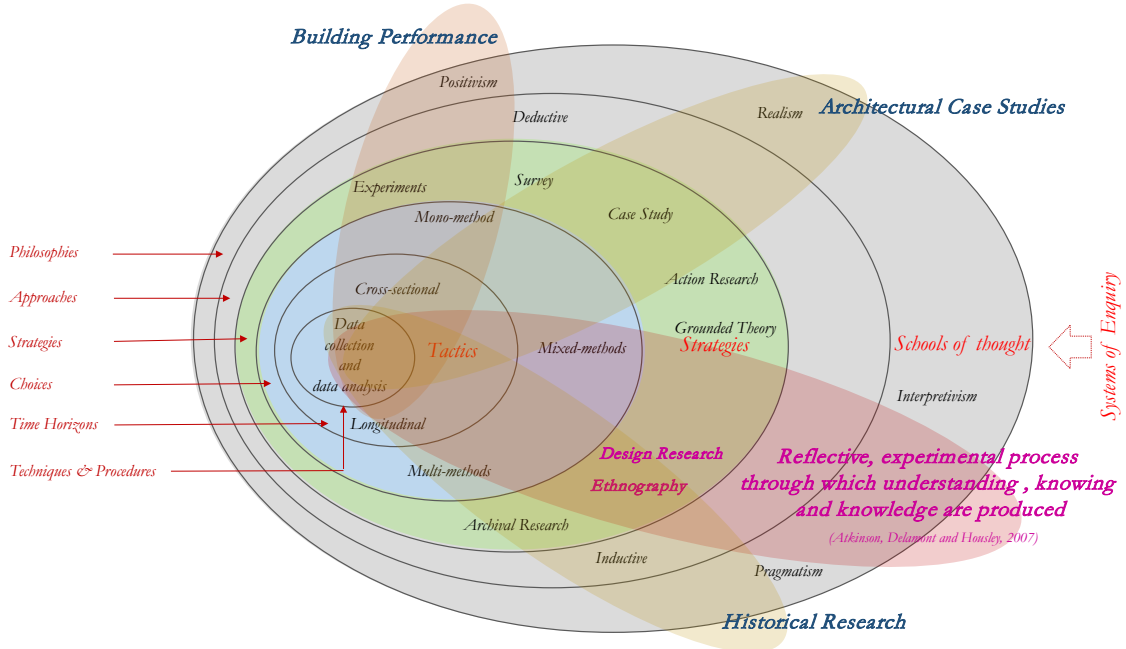

Figure 19 Positioning the research within the 'Research Onion' [adapted from Saunders, Lewis and Thornhill (2009), and reproduced with written permission].

Original diagram © 2018 Mark Saunders, Philip Lewis and Adrian Thornhill

The research strategy and the methods used in this study are integrated and focused by the over-arching research philosophy and approach (Silverman, 1997). By considering the nature of reality, the ontological position (Saunders, Lewis and Thornhill, 2009), what is acceptable knowledge, the epistemological position (Bryan, 2008) and the theoretical position of the research, the researcher was able to establish which research strategy was most appropriate (Gray, 2009). Therefore, the methods chosen were influenced by the research strategy (methodology), which in turn was influenced by the theoretical perspective of the research, and consequently by the researcher's epistemological and ontological position (Gray, 2009).

9.1.1 Research Philosophy

To situate this architectural study within a philosophical position of inquiry, it is necessary to frame the essence of design practice. Simon (1996, p.55) refers to the nature of design as *'courses of action aimed at changing existing situations into preferred ones'*. Schon (1987) advocates for pro-active research approaches, involving designers researching through creative *'action'* and *'reflecting in- and on-action'*. The research approach taken in this study involves reflective practice, where research and practice are brought together, and where the researcher's own knowledge as an architect-practitioner is acknowledged (Gray and Malins, 2004).

Design research in architecture borrows from established research approaches and strategies associated with philosophical positions of enquiry, depending on the creative design problem under investigation (Murray, 2013). Therefore, depending on the research problem, such research could be situated within positivism, realism, interpretivism, objectivism, subjectivism or pragmatism. The key decision for this research was that the creative research aspect would be dominant (Murray, 2013), and would lead to knowledge creation in architecture. For example, within the positivist position, knowledge must be founded on empirical observation or experience (Schwandt, 2001) and will lead to a highly structured methodology, which can be replicated and generalised (Saunders, Lewis and Thormhill, 2009). Numerous studies in the area of building performance have taken this approach (Baborska-Naroznyab and Stevenson, 2015;

Roberts et al., 2019). On the other hand, the interpretivist position emphasises that multiple realities exist as personal and social constructions (relativist ontology). The researcher is involved in the process (subjectivist epistemology) and will propose methodologies that will be interpretative and discursive (Grey and Malins, 2004). Figure 19, shows the different approaches to how a Design Research study could be situated, and the research strategies and methods that could be associated with them.

Considering the two positions of enquiry discussed above in relation to the research questions that emerged from the literature review (Figure 17), it is clear that these are more closely aligned with a constructivist or interpretivist position of inquiry. Therefore, this study was based on a constructivist view of the world, where the methodologies used were reflective and interpretative.

9.1.2 Research Approach

The research approach refers to the relationship between the research philosophy and the approach taken in the investigation, either inductive or deductive (Saunders, Lewis and Thornhill, 2009). Whilst an inductive approach collects data, analyses it, and then creates a theory, a deductive approach develops a theory that will guide the research to its validation (Richardson, 1996; Bryman and Bell, 2011). These approaches are interdependent and there are elements of induction in the deductive approach and vice-versa (see Figure 20) (Buchanan and Bryman, 2009; Bryman and Bell, 2011).

The purpose of this study is to understand material possessions to help inform future spatial housing design from a storage perspective: there is no underpinning theory. This is not to say that the research cannot make a contribution to theory, indeed this study does just that, by developing a new theoretical framework of material possessions to aid housing design thinking. This study combines both practices of design and research within the context of the architect-designer. Therefore, an inductive research approach was considered more appropriate, whilst

still contributing theoretically through the development of a new conceptual framework of material possessions.

Deductive Approach	*Inductive Approach*
Theory  Observations / findings	Observations / Findings  Theory

Figure 20 Inductive / Deductive approach (Bryman and Bell, 2011)

9.2 Research Purpose

In order to ensure an appropriate research methodology for the proposed research question, it is important to outline the purpose of the enquiry (Robson, 2002). The complexity of the study will determine whether there is only one purpose, or more, and whether these purposes are likely to change over time (Robson, 2002; Saunders, Lewis and Thornhill, 2009). Exploratory, explanatory, descriptive and emancipatory are four ways in which the purpose of the enquiry can be classified (Marshall and Rossman, 2011).

As this study is concerned with a gap in the evidence that has been highlighted by practitioners but is relatively unexplored in the literature, an exploratory approach with the public and architect-designers was deemed most appropriate. An *'exploratory study'* allows the researcher to find out *'what is happening; to seek new insights; to ask questions and to assess phenomena in a new light'* (Robson, 2002, p. 59), and is particularly useful when aiming to clarify what the nature of the problem is.

The role of the researcher is crucial, since she is also an architect-designer. Robson (2002, p.446) defines the *'practitioner- researcher'* as *'someone who holds down a job in some particular area and at the same time carries out an inquiry which is of relevance to the job'*. From the perspective of the *'practitioner-researcher'*, the subjectivity, flexibility and involvement will be part of how the research is

approached (Grey and Malins, 2004). Therefore, in this study, the *'practitioner-researcher'* plays a central role. Absolute objectivity is impossible to achieve, and reflexivity and creativity are two key characteristics of the research. Since the research is exploratory in nature, and will use design elements, the research strategy needs to be flexible in order to accommodate new findings, and needs to ask questions and generate ideas in order to inform future research.

9.3 Research Strategy

The overarching research strategy, which runs throughout the DPhil, is design research. This is seen as the primary way to conduct exploratory research in the field of architecture. In addition, a supporting sensory (visual) ethnography (Pink, 2009; Pink, 2011) is used to explore the research problem with visual architectural probes from a very particular point of view, that of material possessions and their impact on the space of the home. Physical models, visual imagery, diagrams and design proposals are used to develop and test ideas (design research), as well as in-depth semi-structured interviews with architects, using visual architectural probes (visual / sensory ethnography). Each activity is followed by a reflective analysis, in order to contextualise the findings and ensure they are robustly drawn from the material available. In particular, the second research sub-question is explored mainly through a sensory / visual ethnography, but with aspects of design research ever-present. In contrast, the third research sub-question is primarily explored through design research with elements of sensory / visual ethnography. This proposed qualitative multi-method strategy allows a set of interpretative practices *'between and within competing and overlapping perspectives and paradigms'* and has been described in the literature as a *'bricoleur'* (Denzin and Lincoln, 1994, p.17).

9.3.1 Design Research

Frayling (1993) identified three categories of what constitutes Design Research in the field of art and design, namely *'research into art and design'*, *'research through art and design'* and *'research for art and design'*. The category identified as most relevant to this DPhil is *'research through design'*, since

its enquiry uses design methods and engages with practising architects to improve or refine what Cross (2001) refers to as the '*artificial world',* the man-made world around us.

Design research is well established and developed (Rust, Mottram, and Till, 2007), but can lead to naïve thinking if not framed rigorously (Rust, Mottram, and Till, 2007). It was first used as a research methodology in art and design, but has more recently been applied to architecture. Rendell (2004) identified aspects of design research in architecture that are comparable to design research in art and design, but also noted that issues such as scale and multidisciplinarity are specific to architecture. Design research examples that have been used for architectural research are not limited to buildings. For example, they have taken the form of installations, talk shows, games and drawings (Mosley and Warren, 2017; Murray, 2013; Fraser, 2013).

Design is a reflective practice in which the architect-designers develop complex solutions to a question (Hauberg, 2011). This reflective practice goes through a process of critical assessment, comparability and evaluation using sketches, diagrams and models as part of an iterative problem (Thomsen and Tamke, 2009). These visual expressions are representations of cognitive processes that visualise things in a different way to words (Hauberg, 2011).

For the purpose of this study, design research is considered as an inquiry, in which design takes a significant role during the research process (EAAE, 2017). This process is validated by the supporting sensory / visual ethnography. The architectural design process ensures that new insights, knowledge and practices that evolve as part of the research are validated by peer review (Hauberg, 2011), in this case through design events, semi-structured interviews with architects and through elements of reflective practice.

This study uses a number of participatory, collaborative and creative processes to answer its research questions. Drawings, physical models, a website, two exhibitions and interactive artefacts have been created. These are examined and interrogated to create new knowledge in the field of architectural design, especially for housing. The discussion and reflections that these

artefacts facilitate are arguably more important than the artefacts themselves (Rust, Mottram, and Till, 2007).

9.3.2 Sensory / Visual Ethnography

In ethnography, research methods have been developed in order to understand people's lives and experiences, and to explore new ways of expressing them beyond the traditional observational approaches (Pink, 2009). Visual ethnographic methods generate visual materials (probes) as a way of exploring research questions (Rose, 2014). The researcher becomes central to developing visual material, and in some instances the participants also generate visual material themselves (Pink, 2009; Rose, 2014) that needs to be analysed by the researcher. The visual material produced is part of the research process, normally alongside interviews or other types of ethnographic field work (Rose, 2007; 2014). Rose (2014) argues that this method becomes an effective tool to generate evidence that other methods alone, like interviews or surveys, cannot, since they lack the visual materials needed to provoke a reaction. However, some still remain sceptical of how the researcher remains objective (Buckingham, 2009; Dicks, Soyinka, and Coffey, 2006).

In visual ethnography, the visual material can become more emotional when combined with dialogue (Bagnoli, 2009; Rose, 2014), as it can channel a sensory experience of an environment (Banks, 2008; Pink 2009; Pink 2011) – the '*design environment'*. The method can be even more effective when combined with interviews (Bagnoli, 2009; Rose, 2014), which allow the researcher to explore the things *'taken for granted'* in the lives (or in this study, ways of working) of the participants (Rose, 2014), and can reveal hidden aspects of their lives (or the way they approach architectural design) (Knowles and Sweetman, 2004).

The proposed research strategy uses a number of design probes that have been developed from the literature and from a range of photographs collected through a participatory exhibition. The probes incite and provoke a reflective dialog during semi-structure interviews. Later they are used as part of a design intervention, where participants are asked to design a specific house

type considering the visual probes. *'Inspirational data'* is captured during the event (Hemmings, et al., 2002) creating a design intervention (Gaver, 2001), where new knowledge is produced.

New methods within ethnographic research have been developed in order to understand people's experiences, and to explore new ways of expressing them beyond the traditional observational approaches (Pink, 2009). Pink (2009, p.8) defined ethnographic practice as *'a process of creating and representing knowledge* [about society, culture and individuals] *that is based on ethnographers' own experiences*'. The practice does not claim to produce an objective or truthful account of reality, but should aim to '*offer versions of ethnographers' experiences of reality that are as loyal as possible to the context, negotiations and inter-subjectivities through which the knowledge was produced*' (Pink, 2009, p.8).

9.3.3 Summary

The research strategy is qualitative and uses a multi-method strategy. It has a dominant design research methodology with a supporting visual / sensory ethnography, which are both explorative and reflexive as well as iterative and dynamic (bricoleur). For this research, the sensory / visual ethnography methodology draws out the general public's views to identify material possessions and storage practices in the home, as well as the architect's experience of designing standardised house types. The design research explores the design problems from multiple perspectives. Both methodological strategies involve the researcher-architect in the development of iterative and explorative visual probes (Boehner, Gaver and Boucher, 2014) to enact a reflective dialog between the researcher – architect and field experts, creating what the author refers to as a *'visual ethnography of the design process'* (see Figure 21).

In order to explore new ways of knowing, and being open to the exploration and reflection of new routes to knowledge, sensory / visual ethnography provides the researcher-architect with a method that is capable of seizing *'the most profound type of knowledge'* that cannot be accessed through typical interviews (Bloch 1998), and can strongly support the dominant design research methodology. In both sensory / visual ethnography and design research, critical reflection is

what differentiates the process from what a designer would do in practice. Figure 22 summarises the methodological approach, purpose and strategy that this study has followed. It highlights in red the methods of data collection and analysis that have been used, so they can be contextualised more broadly amongst other methods, methodologies and theoretical perspectives (see Section 9.4).

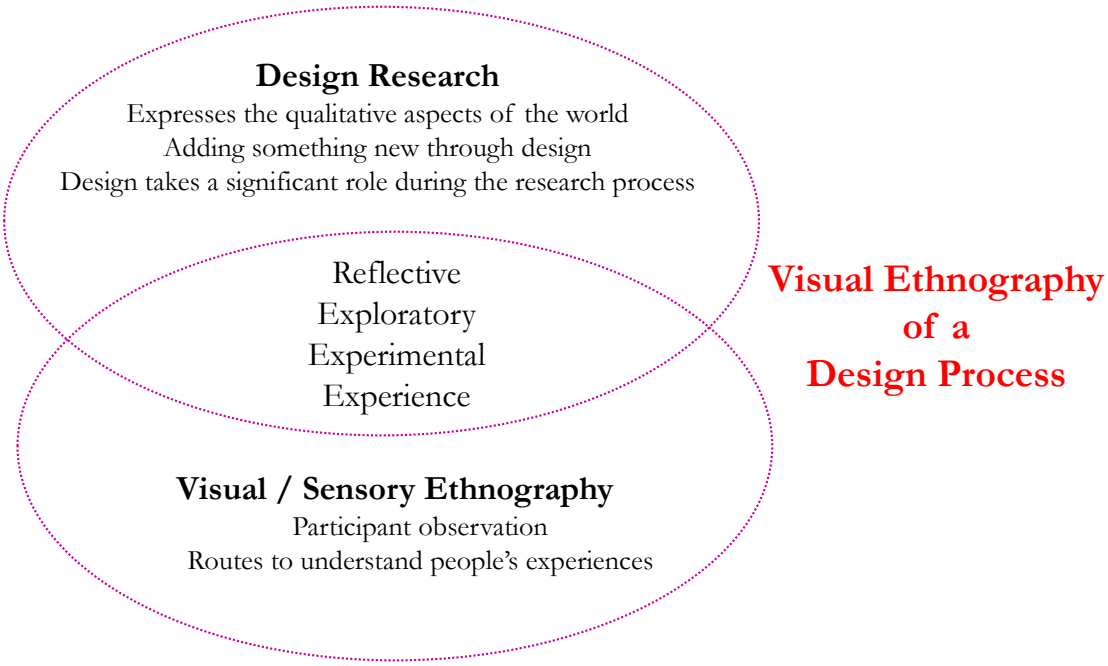

Figure 21 The visual ethnography of a design process

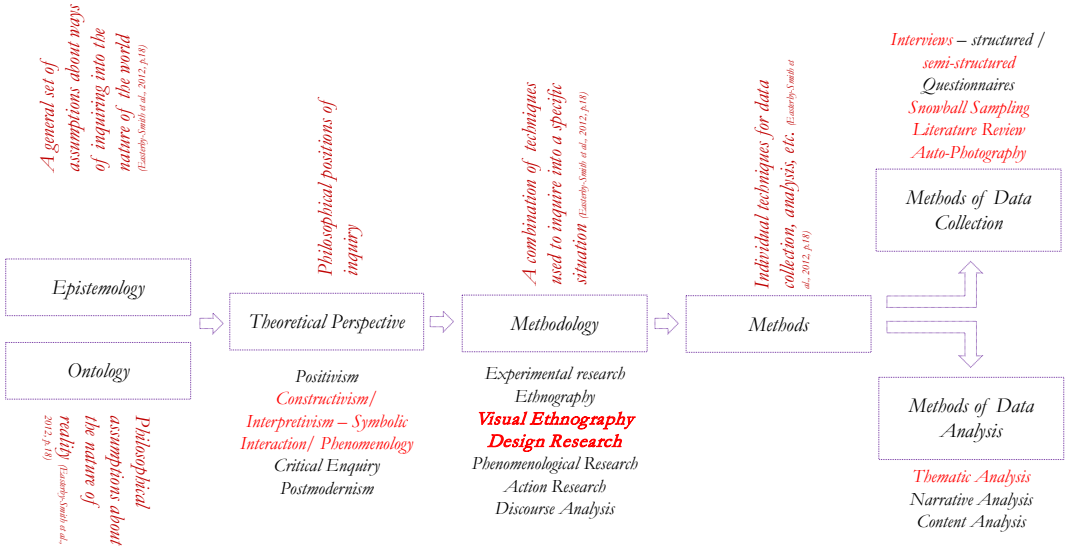

Figure 22 Relationship between Epistemology, Ontology Theoretical Perspective, Methodology and Methods [Adapted from Crotty (1998) with definitions from Easterby-Smith, Thorpe and Lowe, (2012) and methods division from Eriksson and Kovalainen (2016)]

9.4 Research Methods and Data Analysis

The research methods used in this study are qualitative and directly linked to the multi-method strategy presented in Section 9.3. Qualitative research investigates an aspect of the world that is not easily quantifiable and puts emphasis on the interpretation of qualities and processes (Jupp, 2006; Denzin and Lincoln, 2008). Within the field of architecture, Rendell (2004) argues that architectural research integrates research strategies that might typically be kept separate, suggesting an explorative and reflective approach that leads to new directions of knowledge.

In order to answer the research questions and meet the research objectives, four core methods of data collection were chosen: literature review (of which there were two, one historical and one contemporary), auto-photography, participatory design events (of which there were three, a participatory exhibition, a reflective participatory event and a design intervention with architects) and in-depth semi-structured interviews with visual design probes. The data was analysed thematically to identify recurrent themes and patterns.

In this study, the tools used in the architectural design process, such as model making, diagramming and photographing, were crucial in helping to visualise, analyse, synthesise and communicate the research process and its findings. In particular, diagramming became a critical tool that helped refine and re-evaluate the study as it developed. Whilst diagramming in itself can be used as a method (Umoquit, et al., 2011; O'Campo, Salmon and Burke, 2009), in the context of this DPhil it is used as an analytical tool for visualisation, synthesis and abstraction. For example, diagramming is used as a tool as part of the literature review method to synthesise the gathered information and to generate the conceptual framework of material possessions. It is also used as part of the semi-structured interviews' design-probe method, as a tool to capture and synthesise the design thinking of architects. Pallasmaa (2009, p.89) identified sketching and drawing as *'spatial and haptic exercises'* that help designers not only to record, but also to measure, evaluate, correct and re-evaluate a specific experience. It helps *'remember vividly'* (Pallasmaa, 2009) and in this DPhil, the use of diagrams enables the identification of unseen connections,

especially in Outputs #4 and #5. The different architectural tools (diagrams, collages, models, timelines, etc.) used in the study became visual *'ethnographic records'* (Pink, 2009) of the research process in itself.

The study started with two exploratory, broad ranging activities that combined methods to produce the timelines and inter-active website (Output #1) and the participatory exhibition (Output #2). These activities scoped the research problem from different angles through a literature review and a participatory event using photographs generated by the public. These two activities generated the themes that run through the rest of the study. Then, Output #3 abstracted the findings from Outputs #1 and #2 to produce an architectural model. This was used in a participatory design event to review the methodology, test it and reflect upon it. Finally, Outputs #4 and #5 focused on developing a conceptual framework from the literature and the themes identified in Outputs #1 and #2, testing it through a series of participatory events with practising architects. Each of the research methods is described below.

9.4.1 Literature Review Method

The study has two distinctive literature reviews, one a historical literature review with desktop study to identify the influences that have affected changes in the domestic space over time, and another more contemporary review that enabled the identification of characteristics and categories of material possessions and their impact on occupants' use and experience of the home.

9.4.1.1 Historical Literature Review and Desktop Study

In order to explore how material possessions have influenced housing design over the last 200 years in the UK, and how have they affected the way people inhabit their homes, a literature review was carried out to identify the social, economic, technological and political factors that have influenced housing design. For historical data, the literature review focused on historical housing manuals, governmental documents and acts, historical publications from professional bodies and historical grey literature, as well as historical encyclopaedia and key websites such as

that of The Design Museum. The historical data collected was substantial and diverse, and a tailored approach was developed to identify themes over time through key factual information (Creswell, 2007).

This led to a historical data collection of key influences, facts and events that, following a thematic analysis, were grouped into five key themes: Economics and Industrialisation; Health; Legislation and Policy; Society; and Lifestyles and Technology. In order to generate these five themes, a four-phase approach was undertaken: familiarisation with all the data, generation of initial codes / groups, collation into themes and lastly review and refinement the themes (Braun and Clarke, 2006). First, all data, influences and facts, were clustered by year *('descriptive coding'*) and then analysed *'topically'* to explore how such a rich and complex set of data could be *'analytically'* grouped in key core themes (Richards, 2015). Figure 23 shows one of the diagrams that was created to identify and cluster the information in order to arrive the final five key themes. The diagram makes connections across changes in technology (green), space and storage (pink), well-being and health (black) and the house itself (yellow), already making the connections to what the final themes will show.

This part of the study was part funded by EPSRC and the UWE Vice-Chancellor Award (see Chapter 2). It had a steering group from industry and academia that met three times, so the themes identified in the literature could be tested, discussed and refined, depending on their relevance to the changes of domestic space over time.

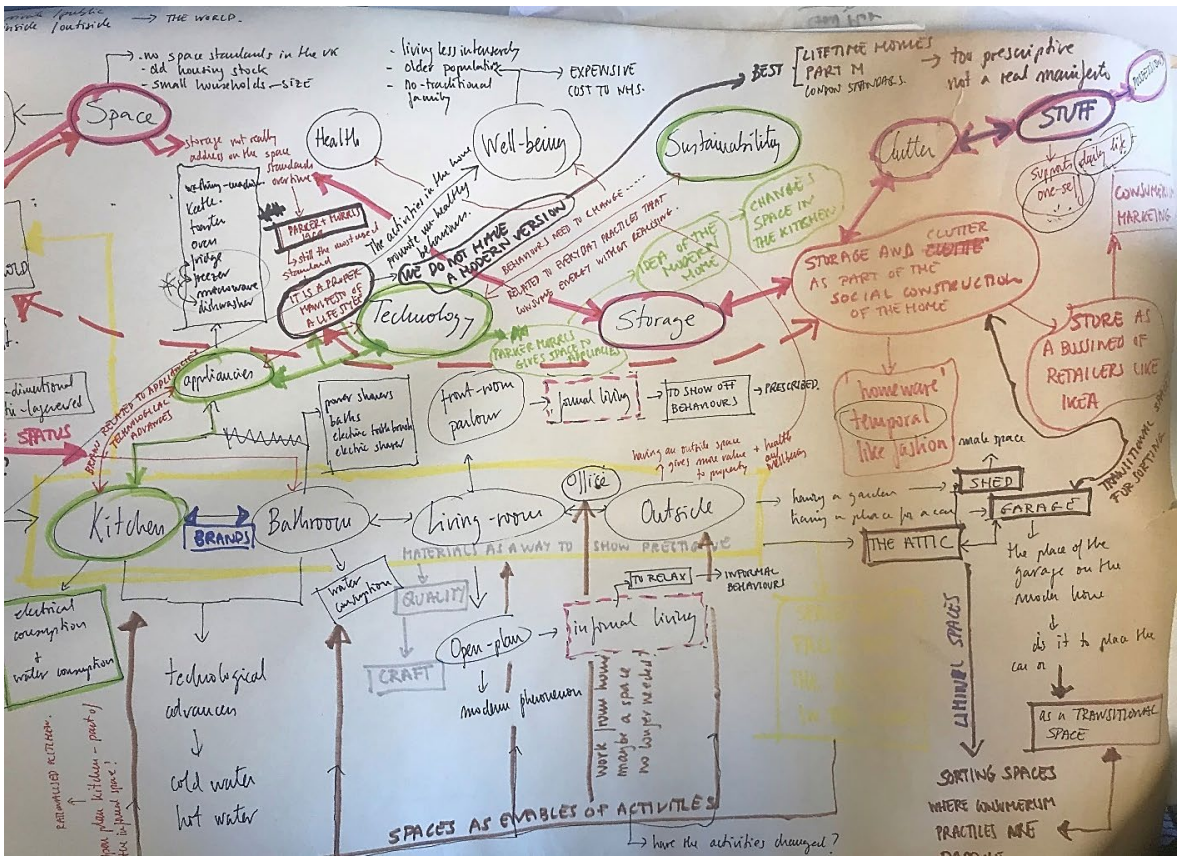

Figure 23 Identifying the themes for the graphical narrative of historcal changes to housing

In parallel, a contemporary desk study of estate-agents' plans, developers' websites and planning applications in a case-study area, Bristol, helped develop a *'generic'* series of houses plans. Bristol was chosen for ease of access to data, and also because it has a broad spectrum of housing typologies and a mix of housing types that are similar to many other cities across the country. The desk study focused on terraced houses, since they are historically linked with English working-class culture and are still a popular and affordable (in some places) choice for the lower and middle classes (Muthesious, 1982; Ravetz, 1995; Nationwide, 2008). This typology is also very much associated with the beginnings of large suburban speculative developments (Muthesious, 1982). The study focused on two-, three- and four-bedroom terraced houses in the UK, representing small-, medium- and large-sized dwellings respectively, constructed from 1800 to present.

The groupings from the historical study (Economics and Industrialisation, Health; Legislation and Policy, Society, and Lifestyles and Technology) were then graphically mapped against *'generic'* house plans generated from the contemporary desktop study, so that physical changes to the domestic space of the terraced house could be better understood. 3D physical models of the *'generic'* houses were also created in the form of a physical timeline, for the most typically built typology, the 3-bedroom house (Hooper and Nicol, 2010). Both the historical groupings and the *'generic'* house plans were then illustrated as five graphical timelines. A sixth timeline of physical models, showing the changes of the typical house type over time, was also produced.

The historical literature review and contemporary desktop study enabled the identification of critical influences on housing design over the past 200 years, an understanding of how the design of today's domestic space has changed over time, and an identification of the role that material possessions have played in this change (see Appendix A). It also enabled the design of the architecture model (see Appendix C).

9.4.1.2 Literature Review on the Characteristics of Material Possessions

In order to identify the characteristics of material possessions, and to explore how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home, a literature review was undertaken focused on relatively contemporary sources to reflect current studies of material possessions in the home, but drew on older literature to give historical context where appropriate. The literature search used the following key words and phrases: *'material possessions'*, *'clutter'*, *'storage'*, *'storage practices'*, *'stuff'*, *'everyday practices'* and *'home possessions'*. It was carried out using SCOPUS, Google Scholar and the Social Sciences Citation Index databases. Initial searches indicated a number of core academic studies and *'grey literature'* (Bryman, 2008; Bryman and Bell, 2011) that were significant. This led to a pragmatic snowballing of the relevant references that helped conceptualise material possessions by identifying their characteristics (qualities) and categories (a set of shared qualities). The review primarily drew from three core disciplines: sociology, anthropology and consumer research

(including material culture). Other fields such as marketing theory, psychology, architecture, planning and housing studies were also included as part of the literature review. However, there were far fewer studies in these areas, and those that did address material possessions focused on particular users, spaces or cultures (Oseland and Donald, 1993; Schor, 1998; Hetherington, 2004; Ozaki, 2003).

All the literature were then analysed again thematically. The thematic analysis first used a *'descriptive coding'*, where the information was gathered and sorted (Richards, 2015). The data was then grouped into the three characteristics *(topics*) found in the literature: value, temporality and visibility. A subsequent *'analytical coding'* (Richards, 2015) conceptualised material possessions and identified their characteristics and categories. Analytical coding requires '*interpretation and reflection'*, as new categories had to be created to express a new way of thinking about the data (Richards, 2015) in order to propose a new characterisation and categorisation of material possessions for housing design. For example, Figure 24 shows two of the diagrams from early in the thematic analysis, where new characteristics of material possessions for housing design were being articulated. The first diagram (Figure 24 top) contains the basic information abstracted from the literature. The second (Figure 24 bottom) builds from the first, and shows graphically two of the characteristics of material possession identified from the literature: the frequency of use and whether a possession will be *'displayed'* (left hand side of the diagram) *or 'hidden away'* (right hand side of the diagram). The examples used in the second diagram were taken from the analysis of the photographs collected for Output #2 (see Chapter 0). This diagram was then refined and reviewed (Braun and Clarke, 2006; Richards, 2015) and was communicated as shown in Figure 25. By encompassing such a wide range of literature, this study was able to make a series of connections across diverse fields of study, and select material that may have meaning to those involved in housing design (Denzin and Lincoln, 2008; Noy, 2008).

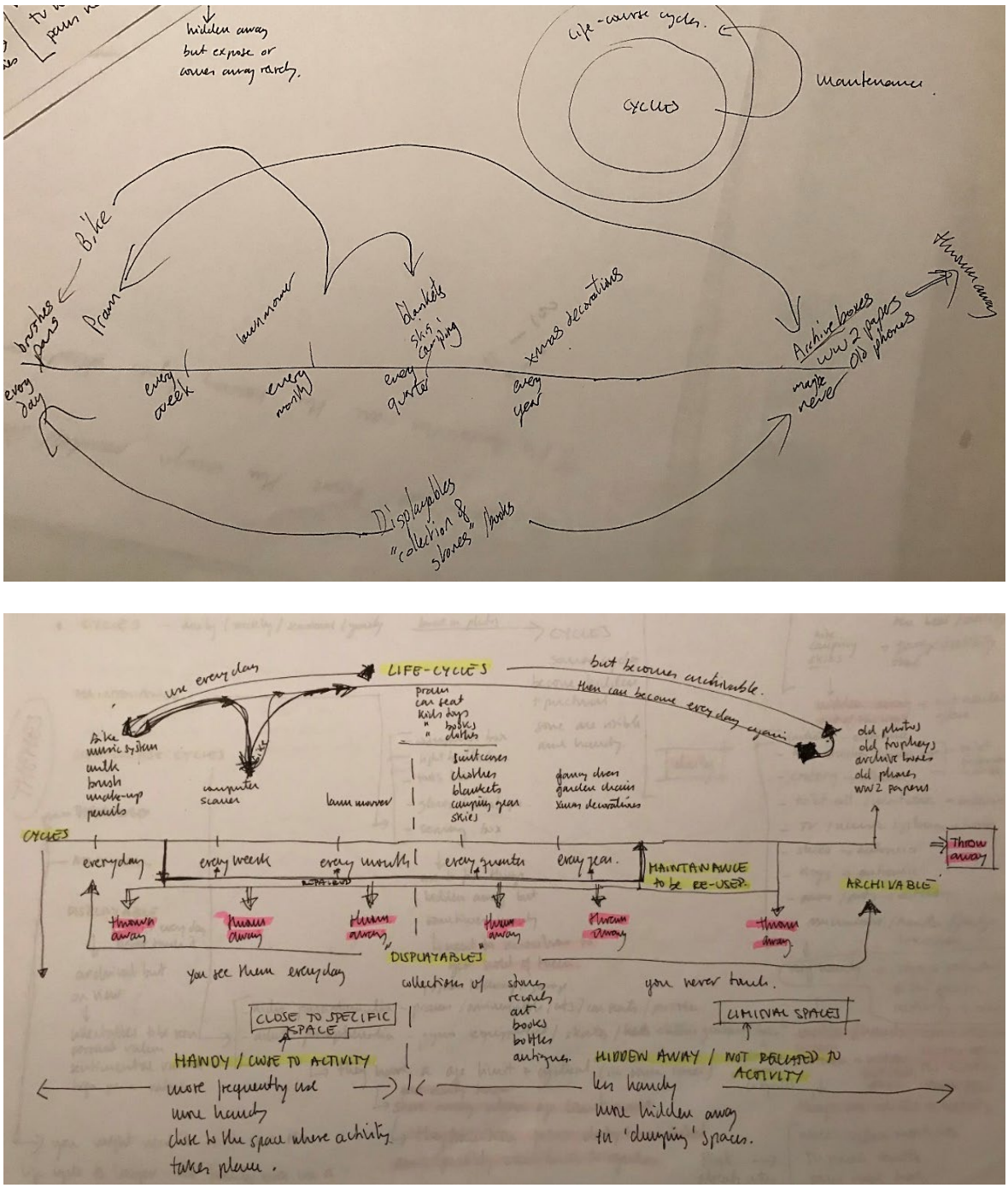

Figure 24 Two diagrams showing how analytical coding was used to identify characteristics of material possesions from the literature

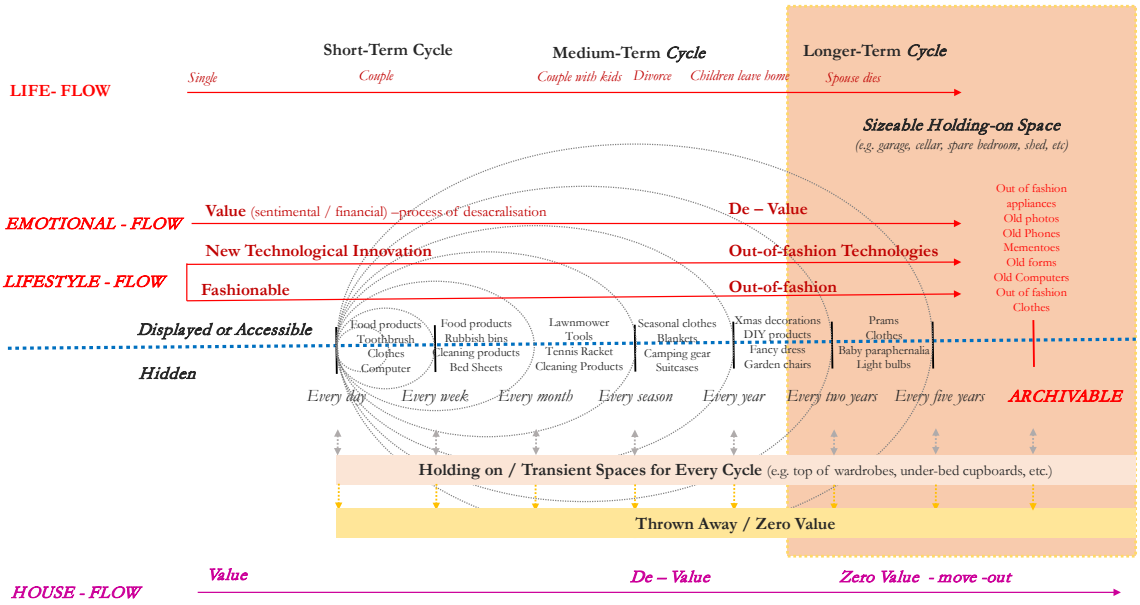

Figure 25 Refined diagram showing two of the characteristics of material possesions identified from the literautre: frequency and visibility.

9.4.2 Auto-Photography Method

Sensory and visual methodologies (Pink, 2009) are an effective way to research how space is used (Dempsey and Tucker, 1994; Pink, 2009; 2011) and therefore data collection methods like auto-photography (Thomas, 2009) are an appropriate way to develop an understanding of the make-up of people's material possessions and their place within today's domestic space. For this study, it was thought beneficial to engage the general public to understand directly how material possessions and storage had impacted in their use and experience of the home. To this end, an interactive exhibition was created, where the general public were invited to submit photographs of their material possessions, displayed or stored. This allowed the viewers of the exhibition to glimpse the impact of material possessions on the space of the home at the particular time when the photos were taken. The general public was contacted through social media platforms (Facebook and Twitter), local newspapers and the Bristol Architecture Centre network of contacts (see Figure 26). The participants were specifically asked to send photographs showing the experiences and activities that are connected to the storage capacity in their homes and the items that they store.

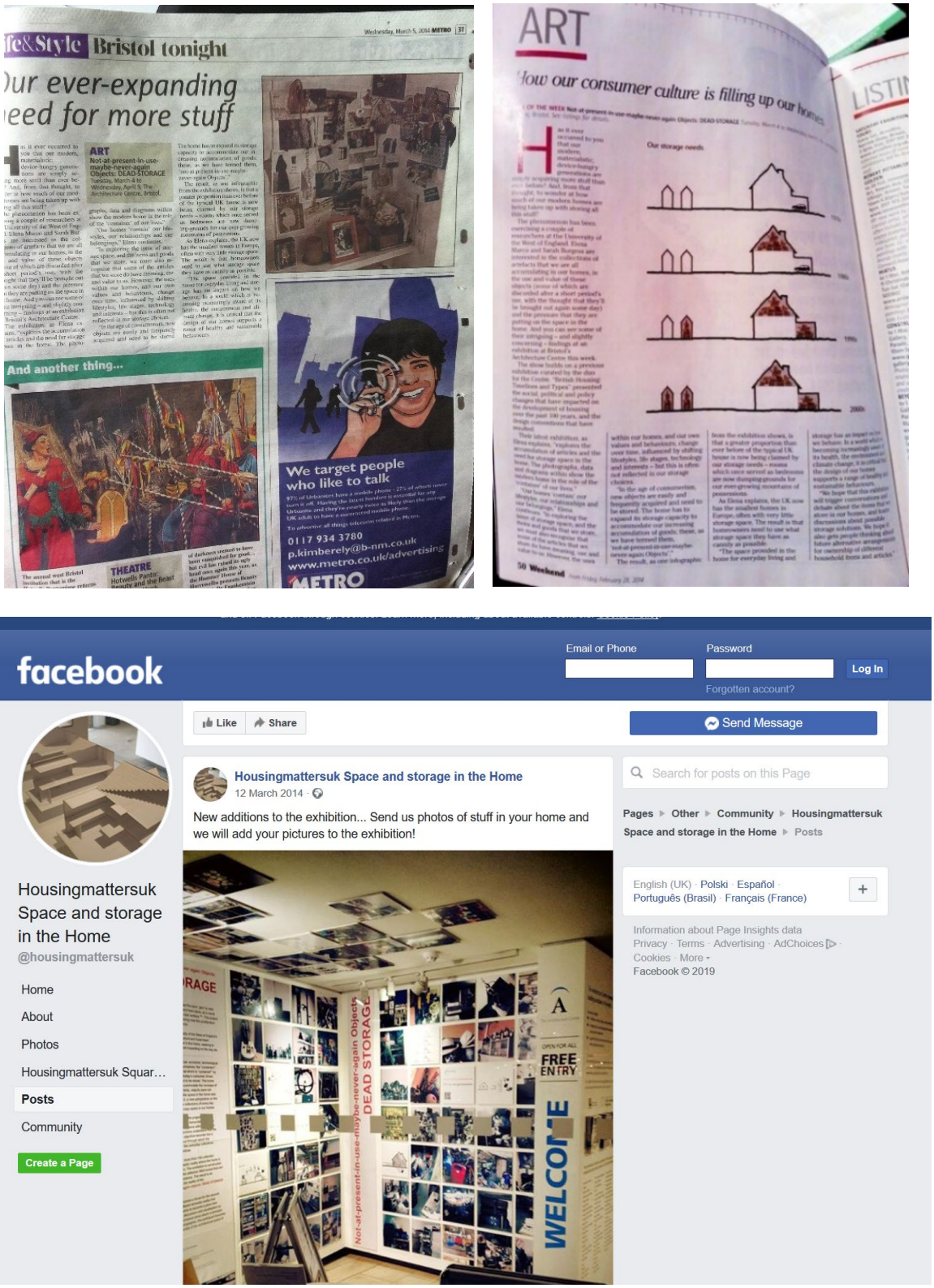

Figure 26 Newspaper articles advertising the exhibition and Facebook page

Two hundred and thirty-four photographs from one hundred and seven participants were collected. At this point in time, the study was still broad and did not aim to get a representative

sample or use a particular type of household or house. Therefore, the photographs could be from any house or household. The aim of this part of the study was to identify themes that could be taken to the next stage of the research, and it was understood that this method, while producing a rich set of data, was not a representative sample and presented limitations to the replicability of the study.

The collection of photographs (see examples in Figures 27 and 28) was first examined to see if there were any duplications or the same photographs taken from different angles. In these cases, the photograph that showed the space and possession best was chosen in order to carry out the analysis and the other versions were discarded. The clean final set of data had one-hundred and seventy-two photographs that were analysed thematically using manual coding. When analysing the photographs, it was important that the focus remained on what is actually shown and not what the researcher imagines is shown, since issues of '*relative significance and context'* have been shown to be a weakness of this method (Robson, 2002; Rose, 2007).

Figure 27 Valuable personal collections

Figure 28 Attics and garages full of stuff infrequently used

The photographs were analysed thematically to identify the impact that material possessions were having on the physical space of the home. First, it was important the researcher became familiarised with the data by conducting a '*descriptive coding*', which started by storing and collecting all photographs and clustering them on printed contact sheets of six per page. Then, an itemisation of all the material possessions identified in each photograph was recorded. At that point, the room that the possessions were placed in was also recorded (if identifiable), as was whether the possessions were displayed for others to see or hidden away. Figure 30 captures the itemisation that took place in relation to some of the emerging themes.

Once an agreed set of groupings was developed (see Figure 29 and Appendix B), the coding was applied to the entire photographic sample to identify representative characteristics and practices. The *'site of production'*, the *'image itself'* and its *'audience'* (Rose, 2007) were carefully considered when analysing the meaning of these images. The photographs were able to give insights into how inhabitants saw the stuff that surrounds their homes at a particular point in time. This enabled the identification of core categories and themes of material possessions that reinforced the conceptualisation of material possessions developed from the literature. The themes emerging from the photographs were used to give concrete examples in the conceptual framework to be used in housing design (see Chapter 5 and Appendix D). The findings from the analysis of the photographs collected though the participatory exhibition were also used to

construct the collages that are part of architectural model used to communicate the research argument (see Chapter 4 and Appendix C).

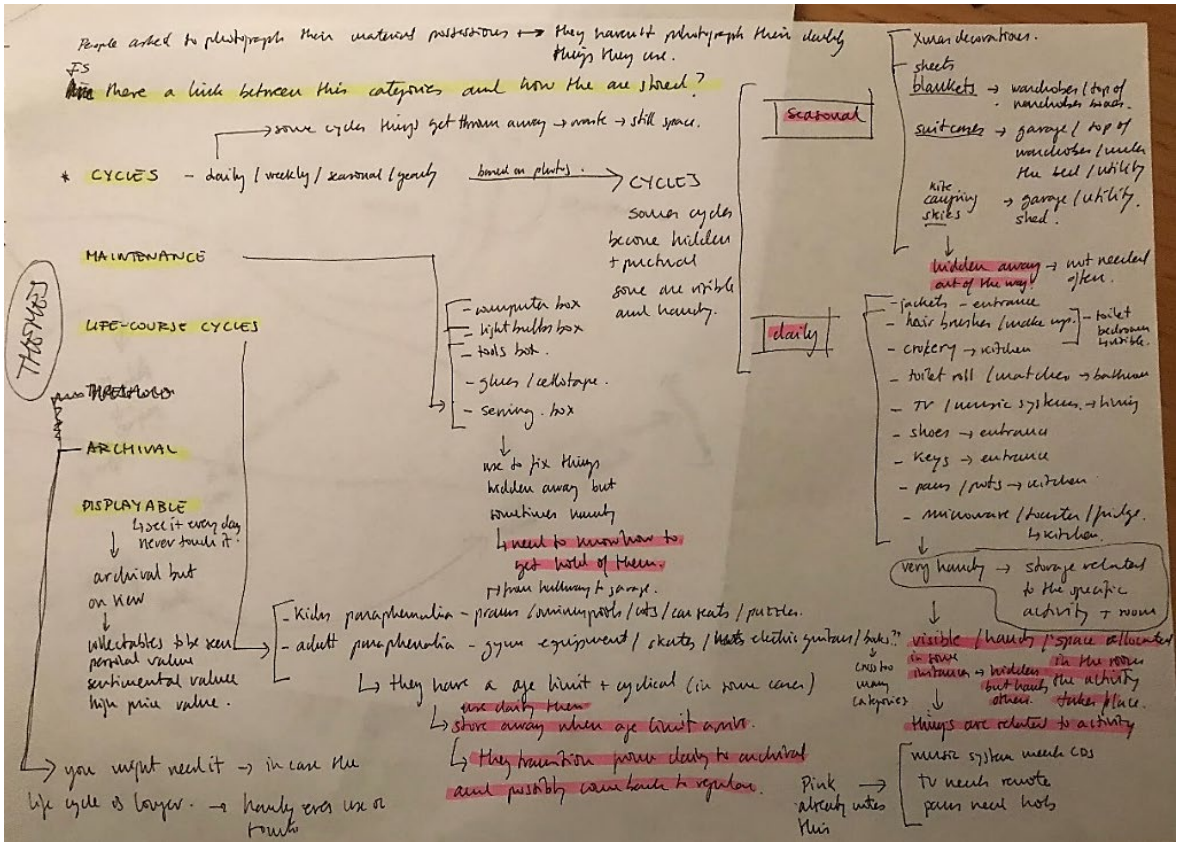

Figure 29 Diagram showing the first groupings

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Figure 30 Diagram showing how the thematic analysis was conducted

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9.4.3 Participatory Events Method with Visual Probes

Participatory event methods involve people in an event that captures common themes and stimulating material from the lives of participants and can generate new knowledge (Park, 2007; Hemmings et al., 2012). The purpose of using a participatory event method is to bring changes to people's lives (directly or indirectly) using events that reveal hidden aspects of common issues that are difficult to articulate (Park, 2007). This study used a participatory event method in three events that are part of the visual / sensory ethnography methodology. The events were designed to use visually constructed design elements, referred to here as the *'architectural probes'*.

The use of carefully designed architectural probes, 2D and 3D, was chosen as part of the DPhil methodology, as opposed to, for example, using a *'blank canvas'* to elicit views. The motivation behind the use of architectural probes was to inspire new ways of thinking, rather than trying to understand existing practices (Boehner, Gaver and Boucher, 2014). For this study in particular, it was important to explore the housing design problem from a new dimension, opening-up conversations from a new unexplored perspective, that of storage, and therefore the use of probes was considered beneficial. These probes were produced for this particular study and are therefore neither generic nor generalisable, but are part of a design process in themselves.

The study used the visual probes in three different ways across three different participatory events, so that each event used a different approach. The first event used a participatory exhibition to get privileged insights into inhabitants' personal spaces and possessions (see Appendix B). Here the probe was used as a data-gathering tool that sought information through photographs from participants. The second event was a reflective event, using the architectural model as a probe to test the effectiveness of the methodology (see Appendix C). The third event, with practising architects is explained in depth in Section 9.4.4 and Appendix E. It used its design-probe (the conceptual framework of material possessions) as a way of seeking new

design insights for housing design from a particular perspective, that of considering the material possessions that inhabitants have.

9.4.3.1 Participatory Design Exhibition

The first participatory design event, as glimpsed in Section 9.4.2, was a participatory exhibition in the Architecture Centre. Macdonald (2007) states that exhibitions are social events, where the visitors are the active translators and actors. For this specific stage of the study it was deemed beneficial to draw from a visual / sensory ethnography, in order to explore whether the nature of material possessions could be captured using a participatory exhibition as a form of *'place-event'*. Pink (2009) defines these ethnographic *'place-events'* as constructed spaces that facilitate the communication of research. These *'ethnographic places'* become meaningful when there is direct participation from the public.

The participatory exhibition in this study was both a *'place-event'*, where the research narrative is augmented, and an *'ethnographic representation',* where *'ethnographic learning'* is gained (Pink 2009). Using an auto-photography method (see Section 9.4.2) participants were given the freedom to select particular domestic spaces and to decide what they considered to be their *'stuff'*, *'clutter'* or material possessions within their home. The inhabitant was an active participant that made decisions on how they wanted to be represented in the visual scene of the exhibition (Thomas, 2009).

Forty-eight photographs were initially collected, and led to the creation of an installation (the visual probe) that became a forum for viewers to express their opinions about the makeup of today's material possessions and the way they occupy space in the home. The exhibition opened to the public for a period of seven weeks and was the strategic mechanism by which interested parties were identified (Robson, 2002) as potential contributors to later research. The visitors also became the participants, and were able to send in their own photographs, which were added to the collection, thereby increasing the sample size. The photographs were then curated and displayed as a standardised box frame, like the utilitarian IKEA boxes that aim to apply order

to the chaos of our possessions. At the end of the seven weeks, two hundred and thirty-four photographs from one hundred and seven participants were collected (see Chapter 0 and Appendix B for information about the design exhibition).

9.4.3.2 Reflective Participatory Event

The second design event was constructed as a reflective participatory event, in order to test and refine the sensory / visual ethnography methodology through an architectural model. For this event it was important to explore the role and effectiveness of architectural probes as a method. This led to the design of a reflective dialog / design event half-way through the DPhil. At the time, it was assumed that the architectural model that emerged from Chapters 2 and 0 would also be used as a visual probe during the planned six-stage design probe event with architects (see Chapter 6).

The value of *'making'* was considered beneficial for this DPhil, and the architectural model was created to engage the participants. Day (1994) and Peeck (1987) commented on the beneficial role of 3D models to engage participants in participatory events, as they help communicate specific characteristics that keep the participants engaged. Salisbury (1998) cautions about the level of detail that a 3D artefact might have, as well as how it has been constructed, as this can have a negative impact on the event if the object is considered *'art'*. Therefore, the development of an architectural probe that was right for this study was crucial to ensure it supported the design of the research, and it had to be tested as part of the study.

Five experts, known to the researcher, were invited to take part in the reflective design event. They were chosen for their expertise in using design research and visual ethnographic methods, and came from the fields of Architecture, Photography, Film and Architectural History. It was understood that the purposeful sample was not representative, however five was seen as the maximum number of participants that could comfortably fit within the physical space and is in line with the group size recommended by Morgan (1998) when the topic for discussion is complex. The participants were asked to engage in a critical discussion of whether the

architectural model added to the sensory ethnographic methodology, and whether it helped to communicate the research argument. The model was used as a catalyst to facilitate a dialogue amongst the experts, in order to create a design intervention event to capture stimulating material (Hemmings et al., 2002).

Prior to the event, a pack was sent to each participant, containing a written and photographic summary of the study so far, along with information on how the event itself was to be conducted and recorded (Figure 31). The summary covered the overall project methodology and explained how an architectural model was to be presented and tested in this context. At this stage the participants were asked to reflect on the methodological approach taken. Three blank A5 cards were also included, on which the participants could reflect, record and sketch their thought processes beforehand, based on the briefing. The experts then came together, led by the researcher to ensure the brief was followed.

The model was placed in a specific domestic space, in order to create a *'place-event'*, where the research narrative could be enhanced (Pink, 2009) and to strengthen the dichotomy between the reality of space and its abstraction. By placing the model (a *'domestic probe'*) inside a physical domestic space (Hemmings, et al.2002), the event was designed to provoke a reflective dialogue amongst the participants, so that the effectiveness of the methodological approach could be tested. The kitchen as a domestic space has been explored in the literature as a place where material possessions and their associated practices come together (Miles, 1998; Pink, 2009; Sutton, 2006; Shove et. al., 2007). The kitchen, within the domestic context of a *'sensory home'* (Pink, 2009), becomes the intersectional node of human and material activities (Shove et al, 2007). Therefore, for this study, the kitchen was chosen as the place in which to carry out the reflective participatory event.

The reflective discussion started with a thirty-minute briefing, where the background to the project was outlined and questions arising from the briefing pack were addressed. The briefing started as a dinner-table discussion (Figure 32). It was held in a lounge area, separate from the

main place-event kitchen where the model was situated. The construction of the model and its meaning had been introduced as part of the briefing, but at this point the participants had not yet seen the model. The participants were able to ask questions and discuss some of their thinking that had already been captured on A5 cards in the briefing pack. Once the briefing was concluded, the main event started in the kitchen area, where the model had been placed centrally (Figure 33). At this stage the participants were asked whether the model communicated the use and experience of domestic space over time as intended.

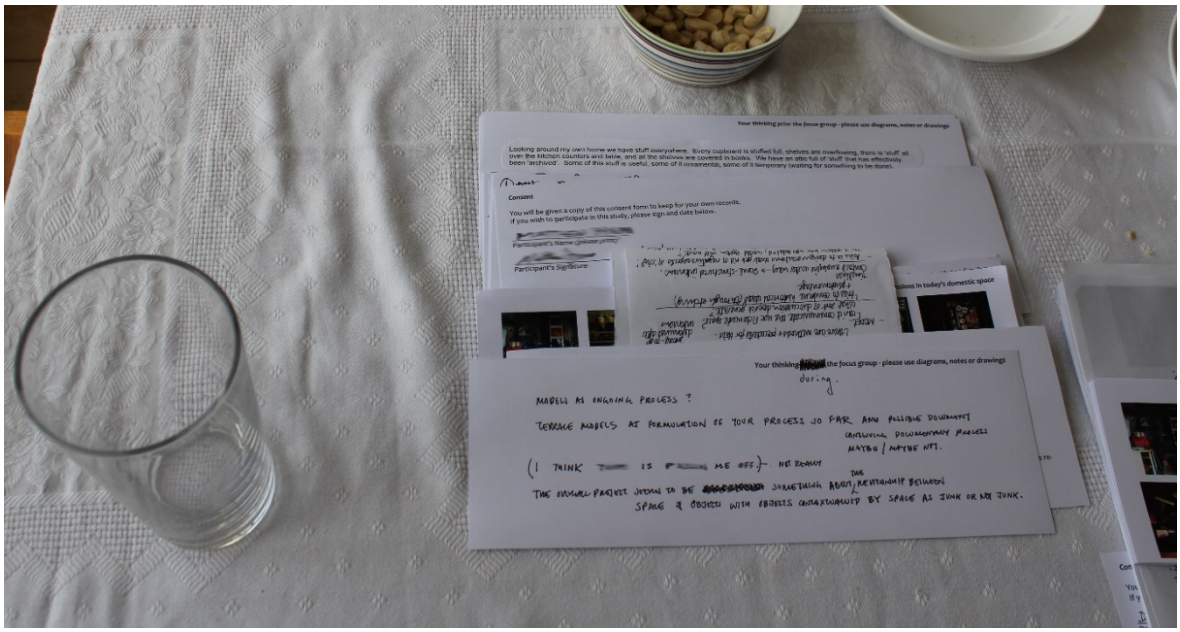

Figure 31 Pack collected from participants after the event

Figure 32 Participants being briefed in the living area as part of the domestic event

Figure 33 Placing the architectural model in context

The event lasted two hours. The dialogue was recorded and photographed, and written notes were taken by the researcher as participant-observer (see Appendix C). The photographic record of both the event and the model was an important additional means of capturing the dialogue beyond the event itself. All this information was then thematically analysed. Figure 34 shows the five stages of the method that was used in the study. First the participants' sketches and notes were analysed to identify the efficacy of this methodological approach to deliver innovation in architectural design. The sketches and notes principally focused on the process

by which the model was created. This theme was then expanded by analysing the audio-recordings and the researcher's notes, which captured two further themes: the effectiveness of the architectural models augmenting a sensory ethnography and the use of a kitchen as a *'place event'*.

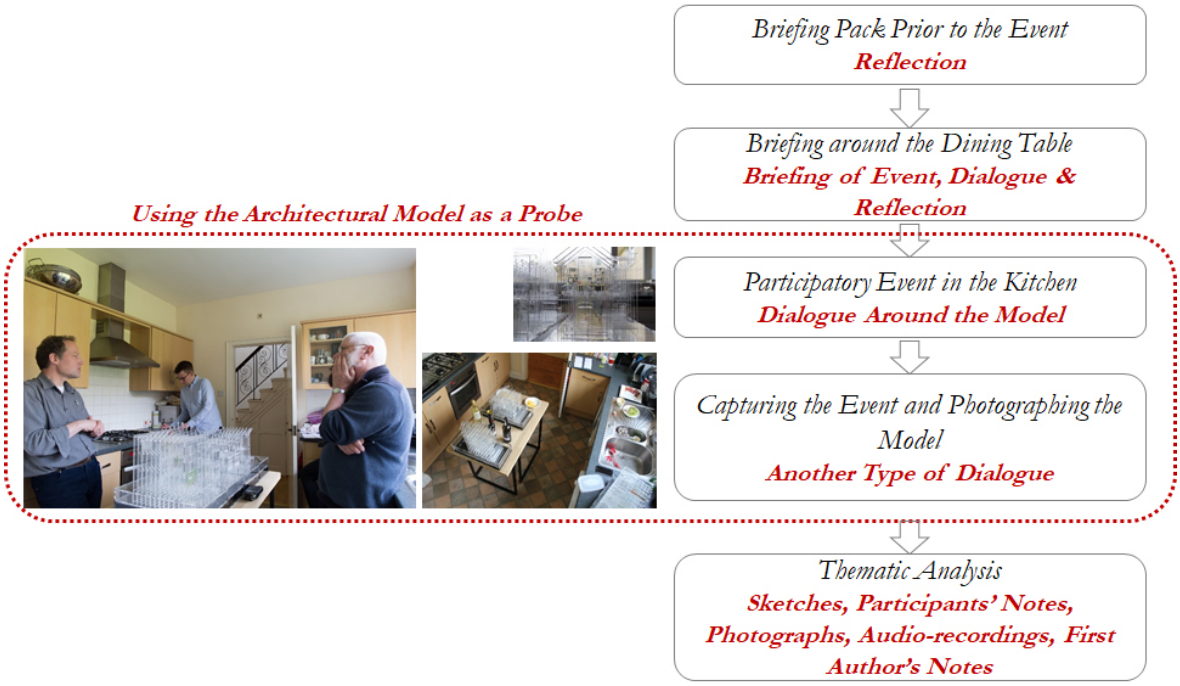

Figure 34 The five stages of the method

The effectiveness of the architectural model was critically analysed and resulted in the design of the six-stage design-probe method with in-depth semi-structured interviews used in the subsequent stages of the research. The event also provoked a rich and reflective discussion that helped focus the next stage of the DPhil.

The value of *'making'* as a way of thinking through design was seen as beneficial. It was therefore suggested that it would be a good idea to construct different visual probes for different purposes and different audiences as the DPhil progressed. The kitchen instigated a dinner-table type conversation amongst the participants that was rich, fluid, dynamic and reflective. Since the research was investigating the use and experience of today's domestic space in relation to material possessions, holding the event in a domestic space surrounded by material possessions

allowed people to draw upon both the kitchen and the model to seek inspiration for their thoughts. The model and its constructed collages were viewed as carefully constructed spaces that record and store the progress of the research, showcasing how the project had developed and trying to communicate in an abstract way the research findings so far. This initiated a discussion on the role of the model within the overall study (see Appendix C).

9.4.4 Six-Stage Design-Probe Method with In-depth Semi-Structured Interviews

Following the critical reflective event, the final stage of data collection developed a visual ethnographic six-stage design-probe method with practising architects (see Figure 35). The method combined qualitative research interviews, in the form of in-depth semi-structured interviews supported by visual probes, with a design event involving the participants. On two different occasions, the method was piloted with a practising architect to test the effectiveness of the probes and to refine the set of questions. The pilot study showed that the dialogue inspired by the visual materials would allow the researcher to explore the *'taken for granted'* (Rose, 2014), and reveal unexpected hidden aspects (Knowles and Sweetman, 2004).

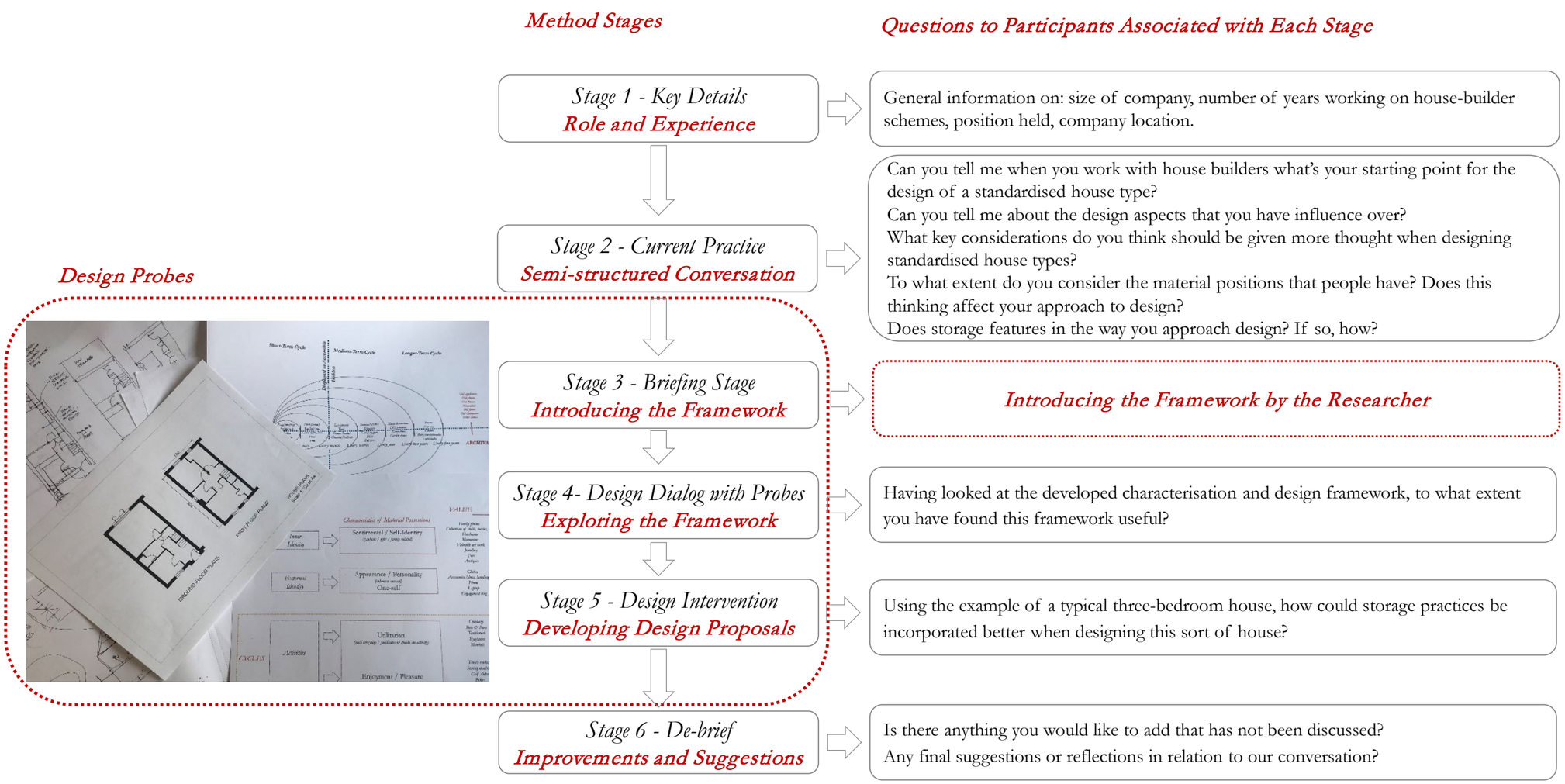

Figure 35 Six-stage design-probe method with associated questions asked to participants

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Prior to the study being carried out it was very difficult to define how many interviews would be necessary to answer the research question (Kvale, 2007) and the sample size was therefore linked to the objectives of the research (Saunders, Lewis and Thornhill, 2009). Guest, Bunce and Johnson (2006) argue that the main guiding principle is to continue conducting the interviews until the data collected does not give any further information into the issue under research. The researcher therefore aimed for fifteen interviews, with the sample selected from participants that were accessible to the researcher (Palinkas, 2015) through her contacts with the Royal Institute of British Architects. The criteria used to select the participants was threefold: that they had worked with house builders, that they covered representatives from small, medium and large practices, and that they held a range of different levels of seniority within practice, so that a range of perspectives could be captured. Initially, twenty-five architecture practices across the South West of England were contacted to be involved in the study, as this area has one of the largest concentrations of such practices outside London. The practices then identified their professional architects working with house builders who were willing to take part in the research. The participants, detailed in Table 1, included architects who work with an array of major house-builders nationally, from small, medium and large architectural practices. The participants also held a range of positions, from Senior Partner and Director (41%; n=7) to Project Architect (41%; n=7) and Associate Architect (18%; n=3). The range of positions was considered important, as it ensures a diverse set of perspectives and approaches to housing design.

Table 1: Key details

Participant	***Size of Company***	***No of years working with house-builders / developers' schemes***	***Position held***	***Company Location***
1	*11*	*11*	*Project Architect*	*Bristol*
2	*24*	*8*	*Associate Architect*	*Bristol*
3	*250*	*8*	*Senior Urban Designer*	*Bristol / London*
4	*5*	*5*	*Project Architect*	*Bristol*
5	*100*	*3*	*Project Architect*	*Bristol / London /Plymouth*
6	*7*	*5*	*Director*	*Bristol*
7	*7*	*5*	*Director*	*Bristol*
8	*100*	*10*	*Director*	*Liverpool / Bristol*
9	*350*	*15*	*Divisional Director*	*Bristol / London /Manchester*
10	*350*	*2*	*Associate Architect*	*Bristol / London /Manchester*
11	*200*	*38*	*Senior Partner*	*London / Bath / Manchester*
12	*60*	*5*	*Project Architect*	*Hereford*
13	*60*	*5*	*Project Architect*	*Hereford*
14	*50*	*25*	*Urban Design Director*	*Bath / Bristol*
15	*50*	*6*	*Associate Architect*	*Bath / Bristol*
16	*30*	*10*	*Director*	*Bath*
17	*30*	*5*	*Associate Architect*	*Bath*

The use of probes (Gaver, Dunne and Pacenti, 1999; Wallace et al., 2013) for participatory design in architecture practice has been used before with residents (Luck, 2007). The use of visual probes creates a sensory experience (Rose, 2007; 2014) that provokes a reflective dialog, interrogation and examination from a very specific perspective. In this case, the question being examined was how an understanding of the impact of material possessions on the physical space in the home might help inform the design of storage. The visual probes (see left hand side of Figure 35) were carefully designed to capture the conceptual framework for housing design developed from cross-field literature by the researcher (see Chapter 5 and Appendix D). The design probes used in this part of the study were five diagrams (design research), four articulated the conceptual framework of material possessions developed from the literature (see Chapter 5), and a fifth consisted of a generic three-bedroom house plan (see Figure 36). The design probes were then used to stimulate new housing design approaches focused on storage for material possessions.

The six-stage design probe method (Figure 35) was designed to ensure current design practices were captured. The usefulness of the framework was then explored by engaging the participants in a design exercise, where the framework was used as a design tool to ensure the participants considered the impact of material possessions in the physical space of the house they were asked to design. Once the *key information* (Stage 1) was complete, the *current practice stage* (Stage 2) asked participants five follow-up questions about how they approached the design of standardised house types and how, if at all, storage considerations featured. The researcher then began the *briefing stage* (Stage 3), in which the participants were introduced to design probes that summarise the conceptual framework of material possessions for housing design (see Output #4). The probes focused the architect's mind on the impact of material possessions in the physical space of the home and their associated storage practices. The *design dialog with probes stage* (Stage 4) then explored the participant's initial thoughts on how the framework could facilitate an architect's approach to designing for storage. This was followed by the *design intervention stage* (Stage 5), where participants were asked to sketch a design proposal for a three-bedroom house, chosen because it is one the most common standardised house types currently being built in the UK (Hooper and Nicol, 2010). A layout from an anonymised typical three-bedroom house was given for reference (see Figure 36). This approach allowed an examination of whether novel storage-design solutions and themes could emerge from the framework. The *final debrief stage* (Stage 6) asked the participants to make any further comments in relation to the study, now that they had used the probes as inspiration. They were also asked to suggest any improvements to the probes, so the original framework could itself be refined as part of this research.

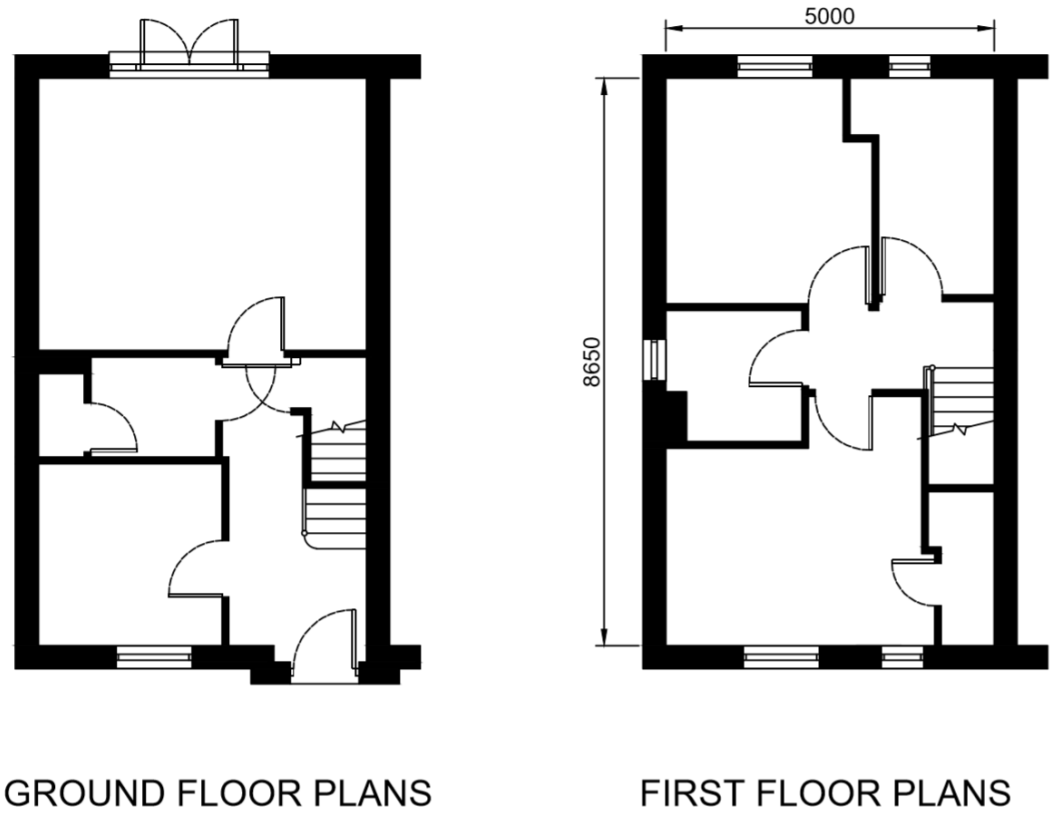
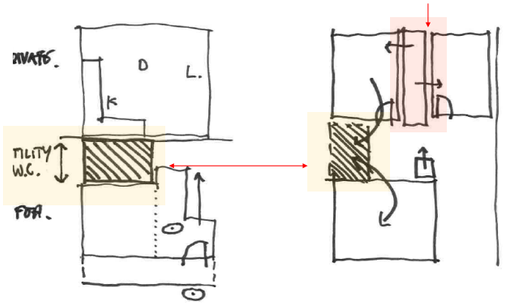
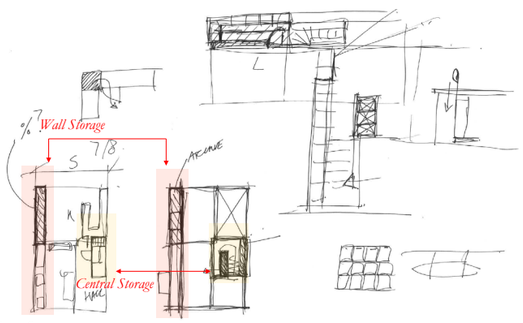


Figure 36 Generic 3-bedroom house builder plan given to participants

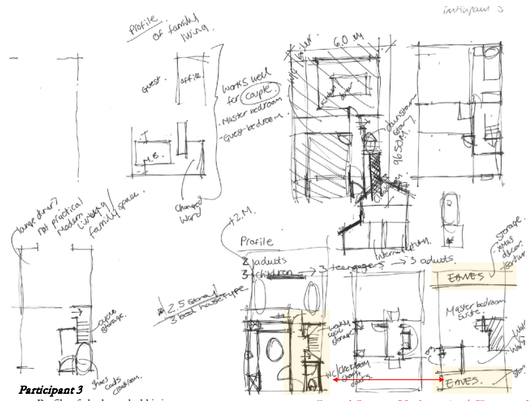
Each interview lasted about an hour in total, with around five minutes for the key details, twenty minutes for current practice and briefing stages, thirty minutes for the design dialog with probes and design intervention and five minutes for the debrief. Everything was audio recorded, transcribed and then a *'manual'* tailored thematic analysis carried out (see Chapter 6 and Appendix E). For example, Figure 37 shows how the thematic coding was carried out on the *design intervention* (Stage 5). First the participants' sketches were analysed to identify where the framework had been applied, in order to identify room specific storage (pale pink) and house specific storage (pale yellow). Common themes were then identified across different participants' sketches, with their similarities and differences highlighted.



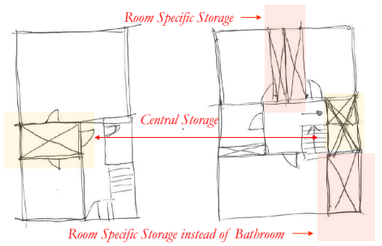
Participant 1
- Critical dimensions for living – Fitting a room
- 3050 was the magic dimension in a bedroom.
- Net gross area x typical construction costs
- Storage as an extra area to be considered in the financial model. – storage as residual
- **Strategies when designing for storage could be: shared storage wall / central storage strategy**



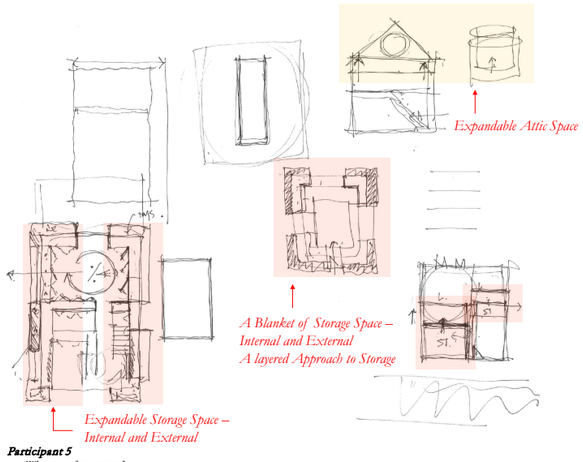
ticipant 2
Storage as leftover
Housebuilders also develop kitchen and bathrooms layouts.
Strategies when designing for storage could be: areas of activities / areas free of clutter / central storage and room storage.
Normally storage as 5% of all area – what quantity of storage makes a difference?

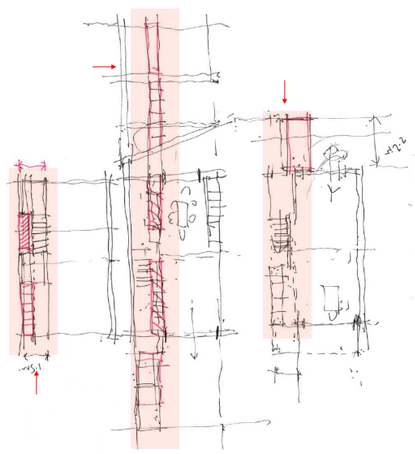


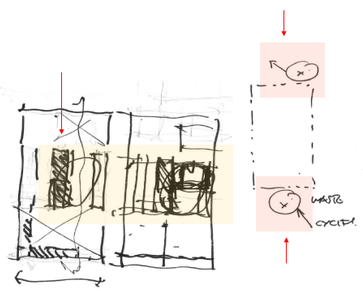
Participant 3
- Profile of the household is important
- Life course needs to be considered
- Generating efficiencies is key.
- **Strategies when designing for storage could be: cloak room spaces / under stairs storage – house specific.**
- Kitchen dinner is more practical for today's living.
- 1 m in each direction if storage needs to be fitted.

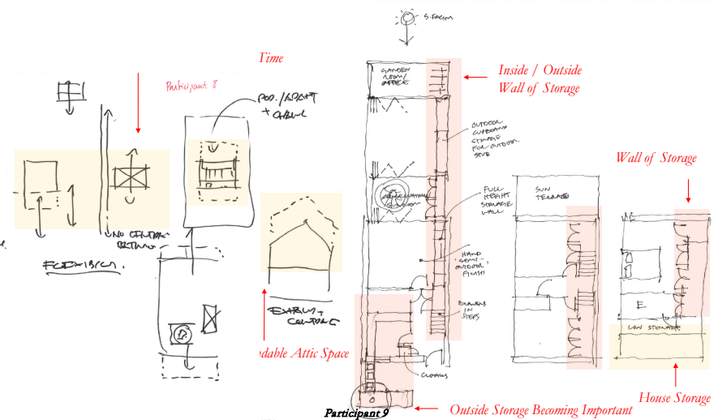


Participant 4
- Loft is an important space.
- Storage will increase the size of the house.
- **Strategies when designing for storage could be: house storage accessible from common areas. Reduce number of bathrooms and give importance to storage. Garage becomes a storage space.**









Participant 5
- Who pays for storage?
- Expandable storage space across room and house specific areas
- Every room as movable storage to reflect one's owns needs.
- **Strategies when designing for storage could be: expandable internal and external storage / movable storage rooms / blanket storage house.**
- A layered approach to storage.

Participant 9
- Important to think about storage at the front and back of the house.
- Staircase as part of he storage wall.
- Flexibility becomes key and the third bedroom goes into the attic.
- **Strategies when designing for storage could be: wall of storage that extends at the front and the back of the houses.**
- Storage as a central storage room.

Figure 37 Identification of thematic codes on the design intervention (Stage 5)

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9.5 Ethical Considerations

Ethics, in the context of this study, refers to the moral principles that guide the research and the appropriate behaviours towards those participating in the research (Saunders, Lewis and Thornhill, 2009). In this research, the main ethical issues were related to privacy, confidentiality, informed consent and data privacy and access. Prior to conducting research with human participants, an application for ethical review of research involving human participants had to be completed in accordance with University Research Ethic Regulations, overseen by the University Research Ethics Committee (UREC) at UWE. The study had three outputs for which University Ethical Approval was necessary, the auto-photography, the reflective event with field experts and the visual ethnographic design-probe with practising architects. For the auto-photography, participants were asked to sign a consent form when submitting their photographs. The participants of the visual ethnographic six-stage design-probe, and of the reflective participatory event with field experts, were informed of the purpose and details of the study and a Participant Information Sheet was given to them, prior to their involvement. The Participant Information Sheet included an explanation of the right to withdraw, how all information would be treated confidentially with any individual or company references removed, and also information on what to do if they were unhappy with the way in which the research was conducted. The Participant Information Sheet also informed participants that a copy of their personal audio recording, interview transcript and diagrams was available if requested. Once the research was concluded, the researcher provided a summary of the findings. Having read the information, if participants agreed to take part, they were asked to complete an Informed Consent Form.

9.6 Summary

The research presented here is based on a constructivist or interpretivist position of inquiry, where the methodology is reflective and interpretative. It follows an inductive research approach, whereby analysis and collection make a theoretical contribution to knowledge,

through the conceptualisation of material possessions in the form of a conceptual framework of material possessions to be used in housing design.

In order to address the research sub-questions, it used a qualitative multi-method research strategy that has a dominant design research methodology with a supporting visual / sensory ethnography. Both methodologies are explorative and reflexive as well as iterative and dynamic. The researcher understood the limitations of these methodologies, but the inspirational data captured and created by using these methodologies was thought to be appropriate for this particular study. These methodologies involve the creation of architectural visual probes that are used to enact dialogues or interactions throughout the project, creating what the author refers to as a *'visual ethnography of the design process'* (see Figure 21). The study used four methods of data collection: literature review, participatory action research (exhibition and design event), auto-photography and a bespoke six-stage design-probe with semi-structured interviews and an embedded design event.

This study involved two literature reviews. The first used historical data collection and a desktop study to explore changes in the domestic space over the last 200 years and to identify the role that material possessions played in this change. This literature review addressed research sub-question 1 and Objective 1. A second, more contemporary literature review was conducted, to enable the identification of the characteristics of material possessions and to explore how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home. This literature review identified key characteristics and categories of material possessions relevant to housing design. These characteristics and categories were then theoretically conceptualised in a framework of material possessions to be used in housing design, creating a new way of interpreting the data. This contemporary literature review addressed research sub-question 2 and Objectives 2, 3 and 4.

To strengthen the findings from the contemporary literature review, the study also used auto-photography techniques to develop an interactive participatory exhibition (participatory action

research method) to capture, at a specific moment in time, insights into inhabitants' personal spaces and possessions. This helped triangulate the findings from the literature review to further address research sub-question 2 and Objectives 2, 3 and 4.

A participatory research method, in the form of reflective design event, was used to test the effectiveness of the methodology. It used a model developed from the findings of the literature review on historical data collection, a desktop study, the auto-photography and the participatory exhibition.

Finally, a visual ethnographic six-stage design-probe method, which embedded semi-structured interviews and a design event, was used with practising architects (see Figure 35). The method used carefully constructed diagrams representing graphically the conceptual framework of material possessions developed from the contemporary literature, so the usefulness of the framework could be tested. Practising architects then used the framework to generate approaches to storage design to improve the inhabitants' use and experience of the home. This method addressed research sub-question 3 and Objective 5.

The methods of data collection in this study required four thematic analyses, each carried out in a particular way, appropriate to the research enquiry. The thematic analysis of the historical literature review and desktop study used *'descriptive'* and *'topical'* coding of the data with some wide ranging *'analysis'*, in order to present a complex and multi-layered set of historical data through six easily comprehensible key drivers. Similarly, the auto-photography method used primarily a *'descriptive'* coding, listing all the possessions identified in the photos and then *'topically'* grouped them. This identified real life examples for the conceptual framework and helped construct the collages that were part of the architectural model. In contrast, the thematic analysis of the contemporary literature review on the characteristics of material possessions used an *'analytical'* coding of the cross-field literature to conceptualise material possessions. This conceptual framework expresses a new way of thinking about the existing data, making a theoretical contribution in the field of architectural research. Its effectiveness was tested with

practising architects, where transcribed interviews, authors' reflective notes of all interviews, and sketches of the design proposals developed by the participants were analysed using '*topical coding'* and then *'analytically'* analysed against each stage of the design-probe method.

The study started with broad, exploratory methods, and as it developed, it became more focused and specific. Throughout the whole enquiry, an explorative and reflective methodological approach has been followed, combining design research with a visual / sensory ethnography. This brought a richness to the study that perhaps traditional methodological approaches would not have achieved.

10 Findings and Reflective Commentary

This thesis has illustrated the evolution of a critical enquiry into the relationship between material possessions and housing design by understanding the nature of *'stuff'* and space in UK houses through five research Outputs. The purpose has been to explore how a design approach to contemporary housing design thinking could be handled in the future, if an understanding of inhabitants' material possessions was carefully considered. The study has not argued for more space, but for a more informed and improved approach to housing design that reflects a contemporary reality, as this will ultimately support the quality of life and well-being of inhabitants.

The study explored the historical and contemporary literature, as well as engaging in participatory events, to bring a new perspective on how to design houses for today's material possessions. It engaged the inhabitants themselves, through an exploratory approach to gather evidence of how people use todays' spaces. It also engaged practising architects in a design exercise to bring a new perspective to housing design thinking - one that has the storage of material possessions at its centre - so storage is valued and flexibility a given.

10.1 Revisiting the Research Questions and Objectives

This section describes how the objectives and research sub-questions have been addressed, in order to answer the overall research question.

10.1.1 Research Questions

Figure 38 articulates, in a single diagram, how the overall research question, the associated sub-questions, and the objectives, are situated within the overall methodology. It shows how the five research outputs of the study, in the context of the methodology and its associated methods, meet the research objectives and answer the sub-research questions, and therefore the overarching research question.

10.1.2 Objectives

This section reiterates each research objective and explains how each has been achieved by the study, as well as identifying the key findings:

Objective 1 - To understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change.

- This objective was addressed by developing a detailed historical study, with a focus on one of the most popular and affordable UK housing typologies, the terraced house (Output #1). By identifying six key thematic drivers, the resulting timelines were able to show, graphically and 3-dimensionally, how housing design has changed over time and the key influences that drove that change. This historical study identified the intrinsic relationship between housing design and the accumulation of material possessions, as well as how material possessions need carefully designed spaces for storage.
- This led to the understanding that the sizes of small (two-bedroom) terraced houses has not changed over the last 200 years. Typologies built between 1930s and 1970s were the more spacious, and the earliest typologies (Georgian, Victorian and Edwardian) the most modified, with added kitchens and bathrooms. Medium- and large-sized terraced houses (three- and four-bedrooms) had shrunk. The bathroom had the biggest impact on house typologies, especially since the 1990s, when housing showed a sharp rise in en-suites and cloakrooms, spaces identified in the literature as *'must-have'* rooms (CABE, 2005; 2009). In medium and large houses, the size of the kitchen halved over the last 200 years, while in the small typologies it remained similar sized over the same time period.

Objective 2 - To identify the characteristics (qualities and quantities) of material possessions and storage practices in today's houses

- Using a participatory exhibition (Output #2) engaging the general public proved to be an inspiring and novel approach to achieving this objective. The photographic evidence captured through the participatory event reinforced the disconnect already identified through the graphical timelines (Output #1) and brought a new perspective on the ordinary.
- The exhibition also enabled core categories and themes of material possessions to be identified, as well as giving concrete photographic examples of each category. These themes were developed further at a later stage of the study (Output #4). The event captured six categories of '*stuff*' across the totality of the home, namely: material possessions associated with specific rooms and spaces, those hidden away or displayed, those associated with cycles of use, those related to a specific point in the life of inhabitants, those related to maintenance and repair, and archival possessions.

Objective 3 - To examine how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home

- In addition to the findings from the contemporary literature review, the data from the participatory exhibition (Output #2) created a richer understanding of where people keep their '*stuff*' and provided examples of how material possessions are taking over space in rooms, across the whole house. This deeper understanding was captured visually in the constructed collages of the architectural model (Output #3). It also helped identify examples of where people keep their stuff and the extent to which material possession are taking over space in rooms.

Objective 4 - To generate a storage-focused characterisation and design framework for material possessions in the home

- This objective was achieved by drawing together literature from sociology, anthropology and material culture to conceptualise material possessions in the form of a conceptual framework to be used in housing design (Output #4). The conceptual framework not only identified characteristics and categories of material possessions with spatial information about the home, but also contained strategies for storage at room- and house-level. It also began to address the weakening functionality of houses currently being built and how this framework could help architects to better understand the nature of material possessions, and how those possessions could be better accommodated in contemporary homes. Considering space for storage in the design of new houses could help householders avoid cluttering the space and therefore impact positively on their quality of life and well-being.
- The conceptual framework identified *value*, *temporality* and *visibility* as the universal characteristics of material possessions that need to be considered in housing design. Valued possessions can be categorised into utilitarian and pleasurable possessions, or possessions that shape the inner and / or external self (value categories). While the utilitarian and pleasurable possessions are part of short-, medium- or long-term cycles, material possessions related to identity are more sensitive to unidirectional flows of time, be they *'life flows'*, *'emotional flows'* or '*lifestyles flows'* (temporal categories). Depending on the sentimental, financial or aspirational value placed on the material possessions by the inhabitants, some items will be visible to themselves and others, and some will be hidden away from view (visibility categories). Whilst material possessions have previously been associated by others as being part of cycles of time (Laermans and Meulders, 1999; Pink, 2012; Cwerner and Metcalfe, 2003; Shove and Southerton, 2000; Hirschman, Ruvio and Belk, 2012), this study has identified material possessions as being part of unidirectional

flows of time. These unidirectional flows of time can be related to changes in life, lifestyles, fashion trends, technological advances and sentimental values, specifically because they are important at one particular moment in time and then they lose value. In addition, this study has identified how material possessions help build inhabitants' inner- or external- identities and how these have been overlooked in both historical and current design guides. This study argues that their consideration could have a beneficial impact on the way housing design is approached both in practice and when considered by policy makers.

- The study proposed new storage strategies for housing design at *house- or room- level* as part of the new conceptual framework of material possessions for housing design. By considering the characteristics of space and possessions, the inhabitant's lives and lifestyles can be better supported, which will have a positive impact in their health and well-being.

Objective 5 - To engage with practising architects to elaborate on these characteristics and storage practices, and to test the usefulness of the framework

- The final stage of the study addressed this objective, by presenting practising architects with the conceptual framework (Output #5). This led them to enact a rich and focused dialog around its effectiveness in practice. It identified their current key considerations for storage and possessions, and which areas of design they have influence over. This led to a better understanding of how houses are currently designed. All the participants found that the conceptual framework was an effective prompt to remind them that real people, with real material possessions, will be living in standardised houses.
- Using the conceptual framework with practising architects demonstrated that the framework could be used when designing new houses.

- The study demonstrated that space for storage has been eroded to accommodate the ever-increasing number of *'must-have'* rooms, and that such space needs to be valued by architects and house builders, not seen as residual or left-over. The loft and the under stairs cupboard have been lost, as *'must have'* rooms like the downstairs toilet or the attic master-bedroom with en-suite are now occupying what was previously storage space, compromising space for storing and also for living.
- The study found that the house as a physical space is a unidirectional flow in itself, since its suitability depends on the inhabitants and the specific moment in their lives. Therefore, a '*life-house'* flow was incorporated into the framework.

Objective 6 - To generate approaches to storage design in the most common standardised house type that improve inhabitants' use and experience of the home and overcome any negative elements identified

- This objective was met by developing a six-stage design probe method that engaged participants in the design for storage of future standardised house types (Output #5), producing new empirical knowledge on how storage can be included in housing design.
- When the participants were asked to design for storage, their approach was to do so in a way that created a valued room, in the form of a *'wall of storage'* or a *'central house storage'*. Some participants' proposals could be seen as *'common sense responses'* that tried to bring back flexibility within the typology. Others attempted to bring back residual spaces that have traditionally been used for storage, such as the loft. Their proposals showed a *'layered approach to storage'* as a vital typological development.

Research Questions

How can an understanding of material possessions help to inform spatial storage design in UK housing ?

Sub-Questions	*Objectives*
1. How have material possessions influenced home design over the last 200 years in the UK and how have they affected the way people inhabit their homes?	1. To understand how the design of today's domestic space has changed over time, and to identify the role that material possessions have played in this change.
2. What are the characteristics of today's material possessions, and how do they influence architects' approaches to the design of standardised house types?	2. To identify the characteristics (qualities and quantities) of material possessions and storage practices in today's homes. 3. To examine in the literature how material possessions and storage have impacted (positively or negatively) on occupants' use and experience of the home. 4. To generate a storage-focused characterisation and design framework for material possessions in the home. 5. To engage with practicing architects to elaborate on these characteristics and storage practices, and to test the usefulness of the framework.
3. To what extent can the answers to questions 1 and 2 help to inform the spatial storage design of standardised house types?	6. To generate new approaches to storage design in the most common standardised house type that could improve inhabitants' use and experience of the home.

Situating the Research Methodology

Research Philosophy
INTERPRETEVIST

Research Approach
INDUCTIVE

Research Purpose
EXPLORATORY

Research Type
QUALITATIVE

Research Strategy / Methodology
Design Research
Visual Ethnography

Methods of Data Collection	*Methods of Data Analysis*
Design Research Methodology *Sensory / Visual Ethnography Methodology* **Literature Review Using Historical Data Collection and Desktop Study of House Plans**	**Thematic**
Sensory / Visual Ethnography Methodology *Design Research Methodology* **Auto-Photography Design Event**	**Thematic**
Sensory / Visual Ethnography Methodology *Design Research Methodology* **Literature Review on the Characteristics of Material Possessions**	**Thematic**
In-depth Semi-Structured Interviews with Visual Probes: Six-Stage Design Probe Method	**Thematic**

Research Outputs

Housing Matters UK – A Graphical Narrative of Historical Changes to UK Housing - Exhibition **www.housingmattersuk.com – Interactive Website**	*Output #1*
'Not-at-present-in-use-maybe-never-again objects: DEAD STORAGE'- Participatory Exhibition **Undressing UK Housing – Architectural Model**	*Output #3*
The Architectural Model as Augmenting a Sensory Ethnography– Journal Paper	*Output #2*
Too Much 'Stuff' and the Wrong Space: A Conceptual Framework of Material Possessions– Journal Paper	*Output #4*
Prioritising Storage Practices: A New Approach to Housing Design Thinking – Journal Paper	*Output #5*

Figure 38 The design of the study

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10.2 Contributions to Knowledge

This DPhil has contributed to the field of architectural research in three areas: theoretical, methodological and subject-specific, as follows:

Theoretical Contributions

- Capturing the intellectual agenda of the house as a *'container'* and the household contents, the stuff, as the *'contained'*. This intellectual agenda, disseminated in the form of an interactive website, advances the theoretical knowledge of the subject of housing design and its associated material possessions.
- Making a novel and original theoretical contribution to the field of architecture by bringing together for the first time, the sociological, anthropological and consumer research literature, to develop a conceptualisation of material possessions in the form of a new conceptual framework for housing design thinking. By using this conceptualisation, architects, policy makers and house builders can evaluate their practice and adopt a new approach that considers the implications for storage in homes, especially when space is at premium. In this study the impact of material possessions on the physical space of the home, as well as the location of storage of these possessions, is presented as a new perspective for consideration in the current housing debate. The framework identified *value*, *temporality* and *visibility* as the universal characteristics of material possessions. Valued possessions can be categorised as utilitarian, pleasurable, and either shape the inner and / or external self. While the utilitarian and pleasurable possessions are part of short-, medium- or long-term cycles, material possessions related to identity are more sensitive to unidirectional flows of time, be they *'life flows'*, *'emotional flows'* or '*lifestyles flows'* (temporal categories). Then, depending on the sentimental, financial or aspirational value placed on the material possessions by the inhabitants, some items will be visible to themselves and others, and some will be hidden away from view (visibility categories). The conceptual framework then integrates these

characteristics and categories with spatial information about the home, in the form of strategies for storage at room- and house- level. Hence, this study has identified how material possessions need relevant and carefully designed spaces for storage. Currently, space for storage is not a priority addressed in the most recently published design guides (DCLG, 2015), regardless of the importance placed on such spaces in more historical guides (MHLG, 1961; BRE, 1993).

- Making a novel and original theoretical contribution to the research fields of sociology, anthropology and consumer research by building on the work of Richins (1994), Kamptner (1989), Dittmar (1991), Csikszentmihalyi and Rochberg-Halton (1981) and Marcoux (2001) through the identification of universal characteristics of material possessions that could be of use in housing design.
- Demonstrating that practising architects found the conceptual framework effective as a prompt to remind them that real people with real material possessions will be living in standardised houses. It produced new empirical knowledge of how storage can be included in housing design, avoiding cluttering spaces and therefore impacting positively on the quality of life and well-being of the inhabitants. The majority of participants who tested the effectiveness of the framework recognised that it unpicked an area of housing design that they had not considered at such a level of detail.
- Using an architectural model as means to synthesise information from disparate sources and provide a visual representation of that information, so that the findings can be visually and conceptually archived.

Methodological Contributions

- Combining two explorative methodologies, design research and visual / sensory ethnography, to capture *'the visual ethnography of a design process'* with practising architects, so an issue raised in practice, but relatively unexplored academically, can be approached from a novel perspective.

- Using different architectural tools (diagrams, collages, models, timelines, etc.) in the study helped to capture *'ethnographic records'* of the research process, to evaluate, correct and re-evaluate the DPhil.
- Developing three core architectural visual probes (design research) for three different participatory events to focus the research as part of the study. The first visual probe was a participatory exhibition, used as a data-gathering tool to get privileged insights into inhabitant's personal spaces and possessions in the home (Output #2). The second was the architectural model in itself, that was used as a probe to record and store the progress of the study and to communicate the research findings in abstract form (Output #3). The model was also used as a probe to test the effectiveness of the sensory / visual ethnography methodology. The third visual probe was in the form of four diagrams that captured the conceptual framework of material possessions as a way of seeking new design insights for housing design (Output #4).
- Engaging users in a participatory exhibition as part of a visual / sensory ethnographic methodology to identify, expose and augment the way possessions are impacting on the physical space of the home and where people keep their stuff.
- Using a participatory exhibition with auto-photographs taken by the general public to unveil the domestic reality of how material possessions impact on the physical space of the home. The event was particularly novel in that it allowed visitors to the exhibition to contribute their own photographs to the exhibition, so the sample size and range of the exhibition grew as a consequence. It showcased a domestic reality that is generally hidden away from the public and only seen by the household or invited guests. It reinforced the disconnect, already identified through the graphical timelines (Output #1), between storage space and the amount of material possessions that a household contains.
- Reflecting on, and testing, two exploratory methods through a design intervention event as way to re-focus the enquiry of the study, and to ensure the architectural probes

became an effective design tool. This also highlighted the importance of creating a *'taxonomy of stuff'*.

- Developing a visual ethnographic six-stage design-probe method with practising architects, which combined qualitative research interviews, in the form of in-depth semi-structured interviews supported by architectural visual probes, with a design event engaging the practising architects.
- Using this ethnographic method, not with participants that have gone through a lived experience (in this context, the residents), but with the professionals that need to understand the residents (the architects themselves), to enact a rich dialog and design response.
- Demonstrating how new knowledge can be produced by engaging a small number of practising architects in an exploration of design using a dynamic and reflective research method that challenged architects to approach a design problem from a new perspective.

Subject-specific Contributions

- Identifying six key themes that have impacted the evolution of the concept of domestic space over the last 200 years. The themes were: Economics and Industrialisation; Health; Legislation and Policy; Society; Lifestyles and Technology; and changes in the domestic space of a terraced house typology. These themes were then developed into six graphical timelines, publicly available on a website, providing a unique representation of the development of the UK's housing stock over time.
- Identifying the disconnect between the available storage space in the home and the amount of material possessions that a household contains.
- Showing that the size of small terraced houses (two-bedroom) has not changed over time, whist medium- and large-sized terraced houses have shrunk. Georgian, Victorian and Edwardian typologies have been modified the most, via additions of kitchens and bathrooms, whilst the typologies built between 1930s and 1970s were the most spacious.

The bathroom has most impacted the overall footprint of the house, especially since 1990s. Kitchens were found to have halved in size in medium- and large- houses over the last 200 years, while it has remined similar in the small typologies. This reduction in size has been linked in the literature with the servantless house and the technological advances in appliances (Muthesious, 1982; Ravetz, 1995), however this study also found significant reduction in storage and work surfaces. Furthermore, the development of '*open*' kitchens (open-plan or kitchen-diner) has also reduced the amount of space available to carry out the different activities associated with the kitchen, lounge or dining room.

- Identifying from inhabitants, through a participatory exhibition, six-core categories of material possessions: those associated with specific rooms and spaces, those hidden away or displayed, those associated with cycles of use, those related to specific points in the life of inhabitants, those related to maintenance and repair, and those which are archival possessions. These categories give an insight into where inhabitants keep their *'stuff'* and the extent to which material possessions impact on the physical space of the home.
- Revealing the material possessions that inhabitants own, and where they are located in the home. This exposed spaces in the home that are hidden, messy and never seen by invited guests. In contrast, it also showcased spaces that are displayed, carefully composed and exhibited for the household members or invited guests to see. Unlike previous studies that have been more focused on material possessions related to specific areas of the house, such as the garage (Hishman, Ruvio and Belk, 2012), open plan areas (Dowling, 2008) or the kitchen (Shove and Southerton, 2000; Shove, 2003), this study included the totality of the home.
- Undertaking a detailed graphical historical study with a focus on UK housing typologies, to assess the evolution of housing that, when combined with the review of possessions

and photographs, demonstrates how the relationship between space and stuff has changed over time.

- Stimulating new housing design approaches focused on storage for material possessions related to activities, inner- or external- self, either at room- or house- level.
- Demonstrating that the space for storage has been eroded to accommodate the ever-increasing number of *'must-have'* rooms that reduce the flexibility of developers' schemes and amount of overall storage space. This study has also argued that a consideration of storage and its associated practices is vital for housing design. It proposes new storage strategies at *house- or room- level* as part of the new conceptual framework of material possessions for housing design. By considering the characteristics of space and possessions, the inhabitant's lives and lifestyles can be better supported, which will have a positive impact on their health and well-being.
- Approaching design for storage by trying to create a valued *'room'* in the form of a *'wall of storage'* or a *'central house storage'*. Storage became a valued dedicated space in itself, one that could be costed-in and marketed by the developers. Creating a valued *'must have'* room that embeds storage is a way to challenge the static developers' portfolios. This study proposes *'common sense'* design responses that bring back flexibility within a standard typology. These design approaches reinforced previous studies, where flexibility had been considered as an essential part of any housing provision (Schneider and Till, 2005). They also built on the work of Bentley (1999), by placing the inhabitants, and their well-being, at the centre of any design decision. However, this study advocates achieving flexibility whilst maintaining current standardised house types sizes and exploring the reduction in number of these *'must have'* rooms. This is a key message for both practitioners and policy makers, as the viability and affordability of housing is an important factor that cannot be ignored.
- Concluding that a *'layered approach to storage'* is crucial. This reinforces previous studies' findings (Schneider and Till, 2005; Wigglesworth, 2019) that housing models need to be

driven by flexibility and adaptability as well as inhabitant's profiles. For example, the framework led two participants to explore the novel idea of an *'expandable and contractible attic space'* to accommodate long term possessions. Another developed the idea of a *'blanket house',* that not only considers internal storage but also external storage (e.g. bikes, bins, garden tools, maintenance tools, etc.). Flexibility has been identified as an essential part of any future housing provision.

- Identifying the importance of providing dedicated storage for *'redundant'* possessions, which have lost value but cannot be thrown away. This would free up spaces like the garage, shed or utility room to be returned to their original function. These '*redundant*' possessions are the ones overwhelming the home (clutter) and most affect inhabitant's well-being, and therefore consideration during design becomes critical.
- Concluding that the current developers' housing portfolios are static and there is a need for new and appropriate housing models. These new models can address the health implications, such as stress, low mood and insomnia that have been associated with the accumulation of material possessions and insufficient space to store them (Raines et al., 2015; Saxbe and Repetti, 2010). By challenging the current developer's portfolios, this study also builds on the work of Imrie (2006), who argues that current models do not meet the needs of vulnerable groups such as disabled people.
- Challenging the way houses are currently sold, based on the number of rooms instead of floor space, so that space for living and storing possessions becomes valued. This has notable implications for housing policy and the current property market approach, as it would require a more informed residents with a better understanding of what they need at different points in their lives depending on their lifestyles.

10.3 Limitations of the Research

The research presented here was exploratory and reflective in nature, covering a complex and multi-layered problem that can be explored from multiple perspectives. The author

acknowledges that the innovative methodological approach and the complexity of the subject in itself has brought with it a number of limitations. These limitations are addressed here in two sections: methodological; and a subject specific.

Methodological Limitations

The author understands that the methodological approach presented in this study could be seen by others as a limitation, due to its lack of replicability and generalisability. This is particularly true of the participatory events with visual probes, as they are specific to this study (Boehner, Gaver and Boucher, 2014). However, the explorative and reflective nature of these events was seen as a strength. They were designed to inspire new ways of thinking, collect complex information and to help see the housing problem from a different and unexplored perspective. Despite being difficult to replicate, and it was never the intention to be so, the methodological approach presented in this study can still be useful to other researchers if used as a framework for exploratory research that needs to consider complex and multi-layered design problems from different and unchallenged perspectives.

Another limitation of the research is, arguably, the lack of specificity of housing, household type or stage of life of the household. However, this study was exploratory and the decision was taken not to limit the data collection to individual types of housing or households. Using a variety of methods of data collection enabled the collection of inspirational data (Hemmings et al., 2002) that revealed unseen insights (Rose, 2014) into how material possessions impact the physical space of today's houses, and made the developed conceptual framework more widely applicable. It also provided a scoping exercise for a new area of future research to examine in greater depth how material possessions impact on different housing or household types. The limitations of the overall methodological approach were understood at the time, but its drawbacks were deemed to be outweighed by the positive impact of the mix on the project itself. For example, the use of a participatory design event and exhibition with an auto-photography method (Output #2) is not precisely replicable. It did not get a large enough

sample to be statistically representative, nor did it target a particular type of household or house. It was nevertheless an effective tool to generate evidence that could not have been gathered with other methods such as surveys or interviews (Rose, 2014), and helped strengthen the findings of the literature review on the characteristics of material possessions (Section 9.4.1.2).

Furthermore, the architectural model (Output #3 and Appendix C) could also be seen as a weakness in the study, as it was not considered by the five field experts to be the '*right*' model to carry out the six-stage method with in-depth semi-structured interviews. The architectural model had such a sophisticated level of detail and abstraction of information that it became a precious object, almost untouchable, if used by architects. This is something that Salisbury (1998) has cautioned against when using 3D models in participatory events. However, being able to pause, reflect and test the sensory / visual methodology through the reflective participatory event (Section 9.4.3.2) strengthened the overall study. It ensured continuous reflective practice (Thomsen and Tamke, 2009), where the dialog and reflection became more important than the artefact itself (Rust, Mottram, and Till, 2007) and ultimately led to a more useful architectural probe being used with the architects.

It is also acknowledged that the reflective participatory event used experts already known to the researcher, and this again could be seen as a limitation. However, the field experts were specifically chosen for their knowledge, and as a sounding board to challenge and enrich the researcher's positioning of the study at that particular time (Crabtree and Miller, 1992). Therefore, the selection of known field experts was seen as a way to challenge the project and contribute to the research in a meaningful way.

Lastly, one of the more difficult aspects of the study was the use of a reflective methodology that involved four different and tailored thematic analyses for a range of methods. The decision was taken to use manual coding for the thematic analyses, as it can provide a greater degree of choice and facilitate greater familiarity with the data. This analysis could have been achieved with coding software, which may have been more time efficient, flexible and objective.

However, software coding does not always reflect the meaning of the text / drawings / photos (Richards, 2015). Since the project itself used an explorative methodology, and having tried the software approach on a different project with little success, the author felt that the explorative process demanded a hands-on approach. During the process, the codes became tools *'to think with'* and helped to conceptualise the diverse collected data (Coffey and Atkinson, 1996).

Overall, while the methodological limitations of the study were understood from the beginning, the benefits of the overarching research strategy outweighed these limitations. This qualitative explorative multi-method strategy has allowed the examination of the research problem from a new and original perspective. Through field experts and practising architects, the participatory, collaborative and creative processes used to answer the research question have been continuously examined and interrogated, ensuring a continuous reflective practice.

Subject-Specific Limitations

The overarching limitation of the study is due to the complexity of the subject matter in itself, and the varied range of perspectives from which this study could have been approached. One of the difficulties throughout has been the broad range of options for the subject matter. Participants, and reviewers each had their own view on the subject and how it should be approached. For example, the study focused on a particular profession involved in the housing design process: the architect. It did not investigate the perspective of the house builders that develop the design portfolios alongside architects and then adapt them to each development. The house builders' insights could have explored the viability and affordability of housing in more depth, whilst design might have taken a back seat. Similarly, whilst the views of the inhabitants themselves were captured through the literature review and the participatory exhibition, they were not included in the architects' design event itself. Inhabitants of different types of households could have enriched the study by capturing perspectives from different genders, ethnicities and geographical, cultural and socio-economic backgrounds. For example,

the way households display their belongings varies in relation to their culture, beliefs, social identity, status or success (Richins and Dawson, 1992; Lury, 2011; Daniels, 2001).

Whilst, within the scope of a single DPhil, not all of the perspectives and voices could have been considered in the overall design approach, for this study, the architects were purposively chosen because of their specific relevance to the research questions (Bryan, 2008).

10.4 Recommendations for Further Work

The author's future research focus will investigate how the conceptual framework of material possessions, and the new architectural design knowledge it has generated, can be used to develop practical guidance for storage design in the home. This will be targeted at architects, residents, house builders and policy makers, to impact positively on inhabitants' quality of life and well-being. While this study has been exploratory and reflective, using design research as the dominant methodology, future work could also consider a more structured and quantifiable methodological approach, by using the conceptual framework developed in this study to bring new and more generalizable perspectives into housing design thinking.

This study has captured the views of the architects involved in the design process. The research could be expanded, to capture the views of house builders and of the inhabitants (or groups of inhabitants) themselves, and to further inform housing design thinking for standardised house types, as new perspectives would continue to refine the findings of this study. Furthermore, investigations into the usefulness of the conceptual framework in different geographical, cultural and socio-economic contexts would help broaden its applicability.

Whilst this study has focused on the smallest units, the standardised house types, future research could also broaden this remit, to explore different typologies with specific household compositions. This could bring a much more detailed approach to housing design thinking and add another layer of complexity to how housing design could be approached.

10.5 Epilogue

Having completed this study, the researcher now advocates for housing policy makers, practitioners and architectural researchers to acknowledge the relationship between material possessions and housing design. By better understanding the nature of *'stuff'* and space in UK houses, houses can be better designed. Storage needs to be valued and flexibility has to be the default, so that new models of housing can emerge that address the well-being and health implications associated with the cluttering of space. These new models cannot ignore the viability and affordability of housing, especially when considering the smallest units, the standardised house types, but neither can they ignore the needs of the inhabitant's themselves.

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Part C – Contents of the Five Outputs in Appendices

Part C presents the contents of the five Outputs themselves in a series of appendices. Where the output is a physical object or exhibition, the appendix contains photos, exhibited graphics and relevant web-links as well as the narrative. Where the Output is a published paper, the Appendix contains a copy of the article, in whatever form is permitted under the publisher's terms and conditions. Numbered references to Figures in the published papers refer to the Figure within that particular paper, to maintain consistency of numbering with the published work.

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12 Appendix A – Timelines of Housing Typologies in a Social Context: Graphical Timelines and Interactive Website

12.1 Description

Five graphical timelines were created (see Figure 39), mapping the historical changes to housing over 200 years, and illustrating housing trends within the bigger picture of policies, society, industrialisation, health, the economy and technological advances. The mapping of historical changes helped understand how they were associated with lifestyles, storage and material possessions (stuff). Storage revealed itself as reactive to changes in social, economic, technological and demographic drivers. In times of plenty, possessions are acquired and need to be stored, and the home has to expand to accommodate these possessions. In times of hardship, possessions are not replaced and valuable storage space is given over to more practical uses, meaning a home has to make the best use of what little storage space it has.

Figure 39 The graphical timelines as exhibited in the Architecture Centre, Bristol.

Photo reproduced with permission © Jodie Marks

These historical themes were also mapped against *'generic'* house plans generated through the desktop study of two-, three- and four-bedroom terraced houses (small-, medium- and large-size dwellings). The terraced house was chosen as it has been historically linked to working-class dwelling and the first mass-developments, as well as still being a popular and affordable (in some places) choice (Muthesious, 1982; Ravetz, 1995; Nationwide, 2008). This led to the creation of

3D-physical scale models of the *'generic'* houses (Figures 40 and 41), the 3-bedroom house type, the most common typology still being built in the UK currently (Nicol and Hooper, 1999). This formed a physical timeline, that captured historical changes to the house layouts, changes in construction and the standards (if any) that had influenced size and layouts.

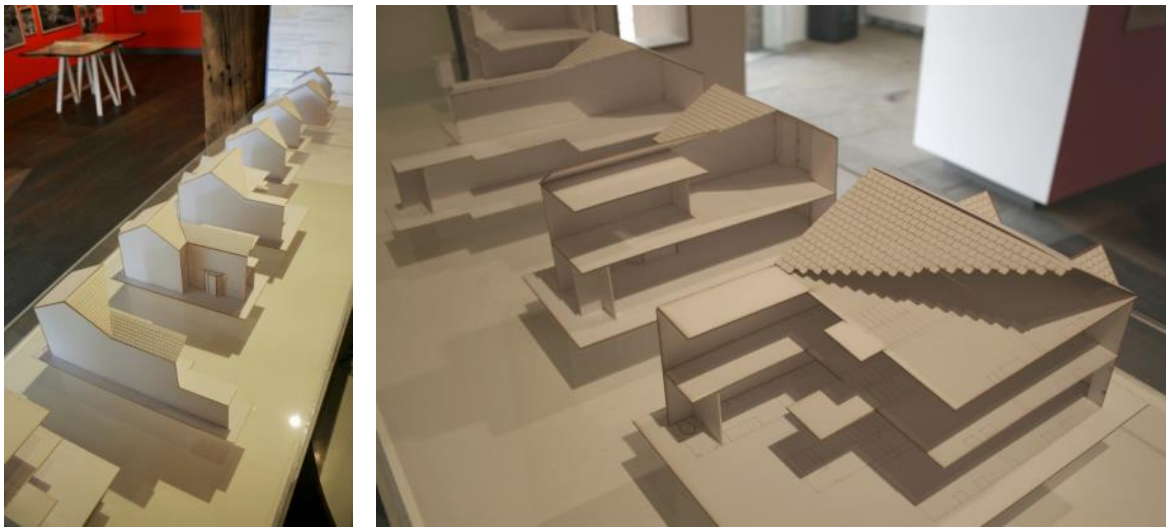

Figure 40 Physical models of housing typologies through time. Photo reproduced with permission © Jodie Marks

Figure 41 Changes in the Kitchen and Bathroom Overtime

The desktop study identified that that the overall size of small (two-bedrooms) terraced houses has not changed over the last 200 years, with typologies between 1930s to 1970s being the more

spacious, and the earliest typologies (Georgian, Victorian and Edwardian) being the most modified to add kitchens and bathrooms. The medium and large sized terrace houses (three- and four-bedrooms) had shrunk over the last 200 years, showing up to a 30% reduction in size, especially in the four-bedroom houses. The bathroom has been the room that has had the biggest impact in house typologies, especially since the 1990s when the examined typologies showed a spiked rise in en-suites and cloakrooms that could account for 10-12% of the overall floor space, while in the earliest house typologies they generally accounted for around 4%. In medium and large houses, the size of the kitchen halved, while in the small typologies it remained similar sized over the 200 years. Historically, in the earlier typologies, the *'kitchen'* in the small terrace houses would have a multi-purpose function besides cooking; one dined, lived, bathed, and even slept there up until the 1920s (Muthesious, 1982; Ravetz, 1995). Whilst in medium and large terraced houses the '*kitchen areas'* are associated with sculleries, pantries, cooking areas, cellars and laundry rooms, as well as servants' quarters. Since the 1970s, the kitchen has notably reduced in size and this has been linked with the move towards a servant-less house and technological changes, especially the ever-increasing appliances associated with the kitchen. The kitchen also shows significant reduction in storage and bench space. The development of *'open'* kitchens (open-plan or kitchen-dinner) means that the overall size available to carry out the different activities associated with the kitchen, the lounge or dining room has reduced.

The findings were also abstracted and summarised in and architectural model (see Output #3 in Chapter 4 and also Appendix C) that articulates a narrative by which the qualities of the domestic space, in relation to accumulation of material possessions, are portrayed. The model captures the historical changes, both in the fabric of the building and in the use and experience of the space within. These have shaped the key findings and theoretical concepts about the relationship between the home and lifestyle, and storage and material possessions (stuff).

12.2 Photos of the Timelines

The timelines are available as an interactive web-app at www.housingmattersuk.com (see Figures 42 and 43) and also shown as they were exhibited in Figures 44-48.

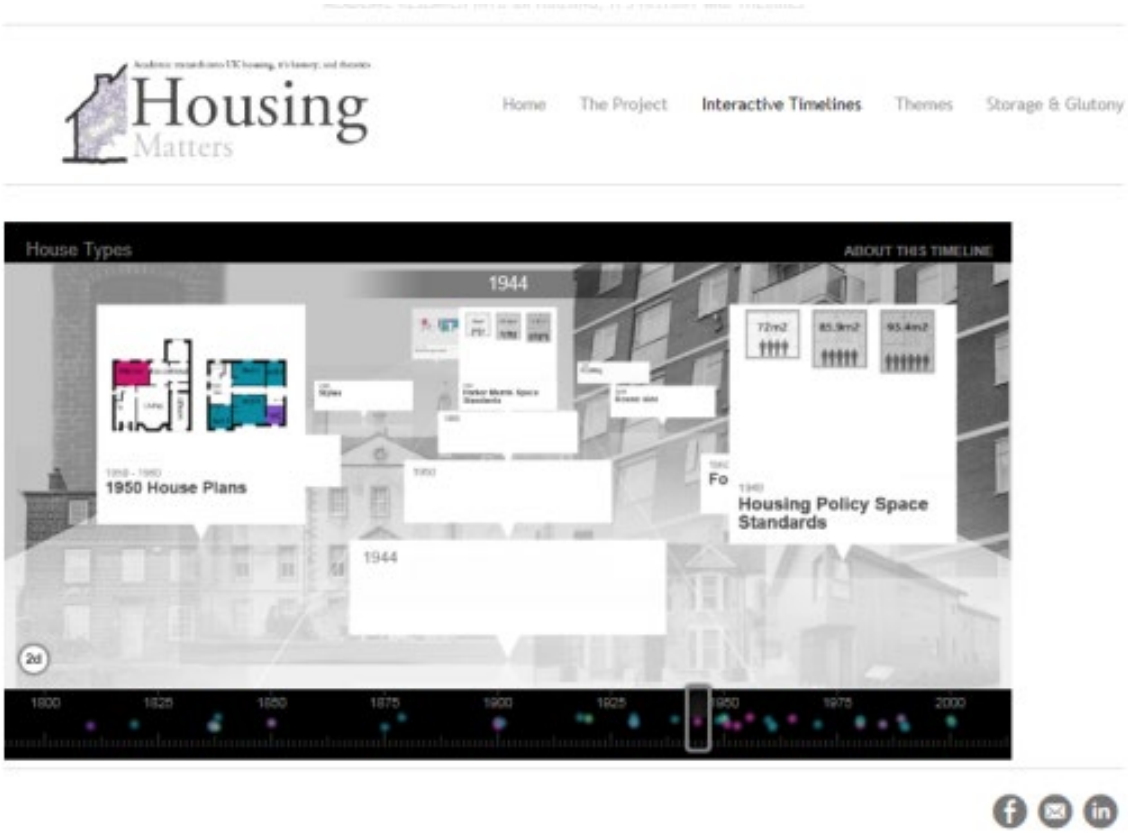

Figure 42 Interactive timelines – www.housingmattersuk.com

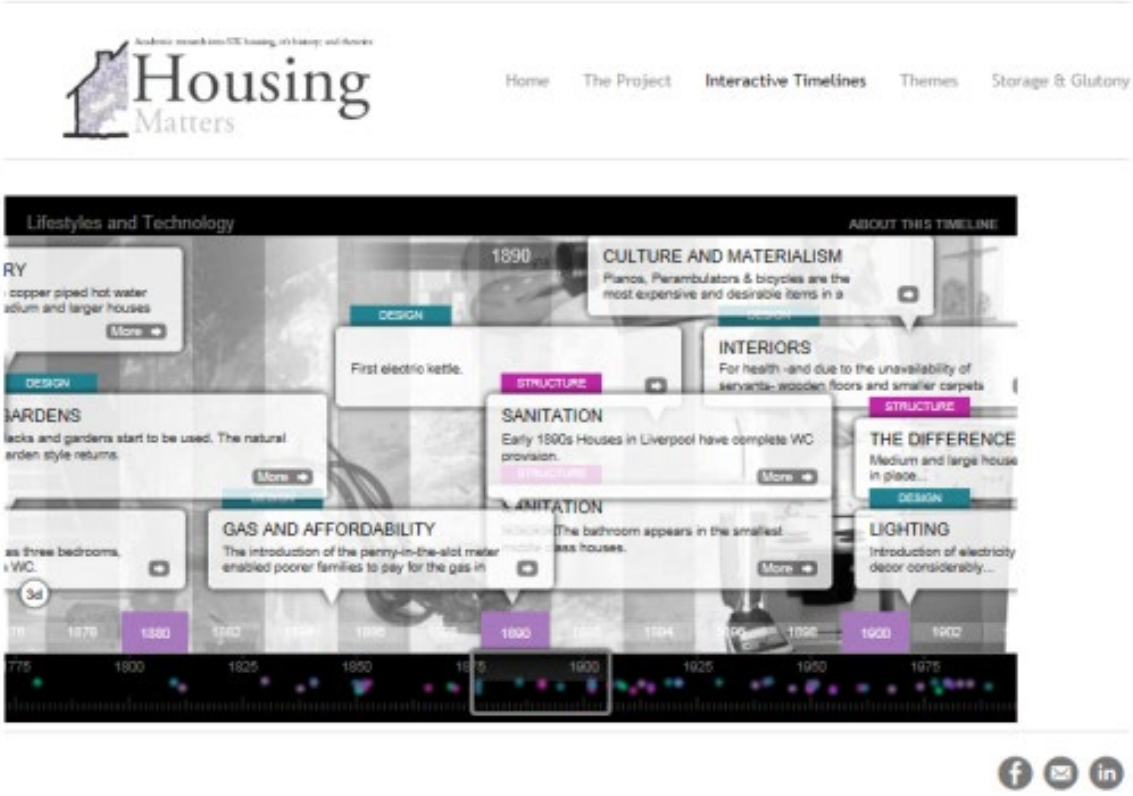

Figure 43 Interactive timelines – www.housingmattersuk.com

The study was presented at the UK / Ireland Planning Research Conference 2012 and at research seminars at the Universities of Bath, Edinburgh and Heriot Watt. The project was also part funded by EPSRC (under a Bridging the Gaps grant to foster interdisciplinary research), and by a UWE internal grant (Vice-Chancellor's Award). Furthermore, in order to secure the exhibition in the Architecture Centre, Bristol, a proposal to the yearly programme of events was put forward and reviewed favourably by its Board.

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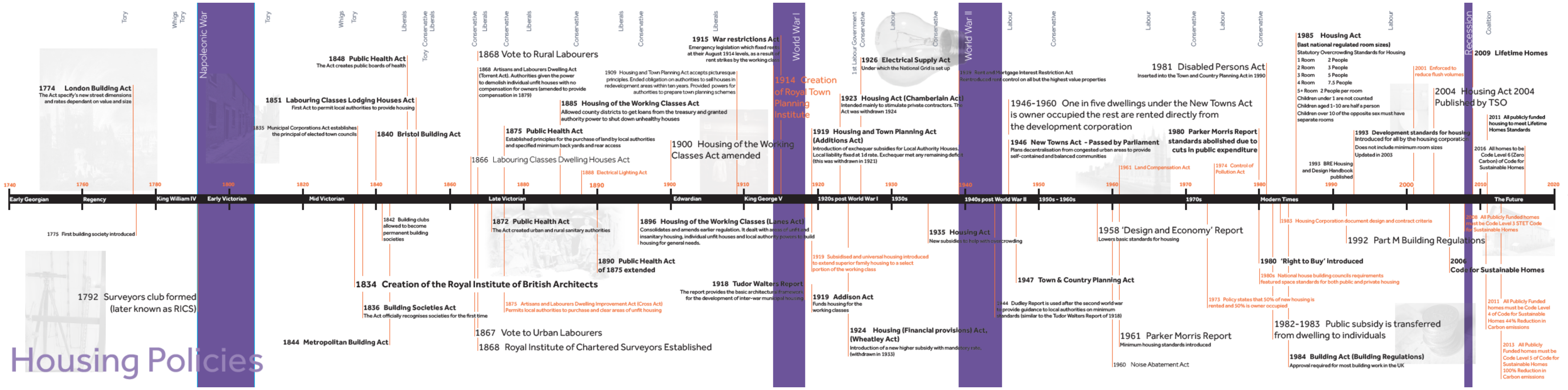

Figure 44 Housing Policies Timeline

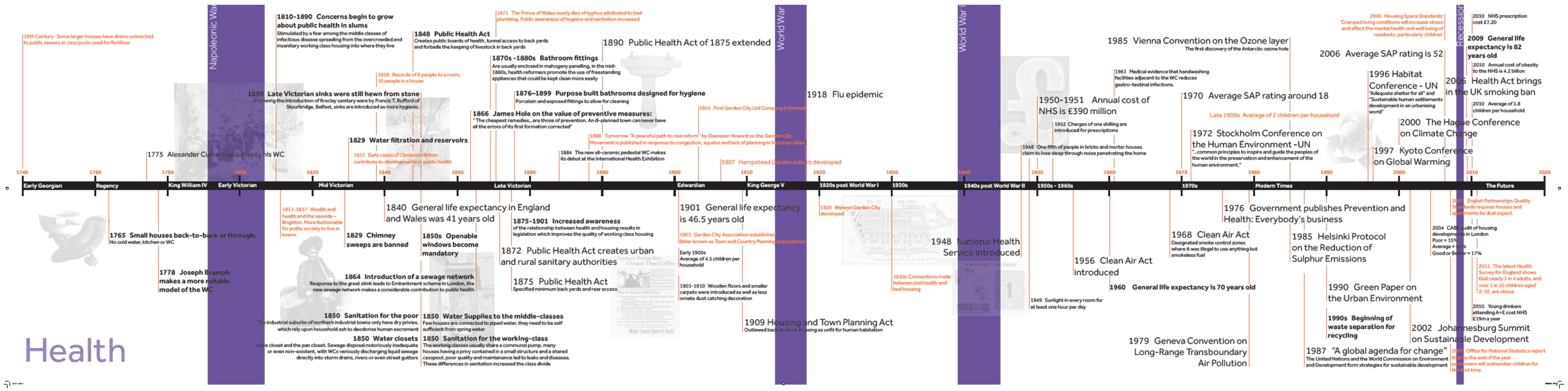

Figure 45 Health Timeline

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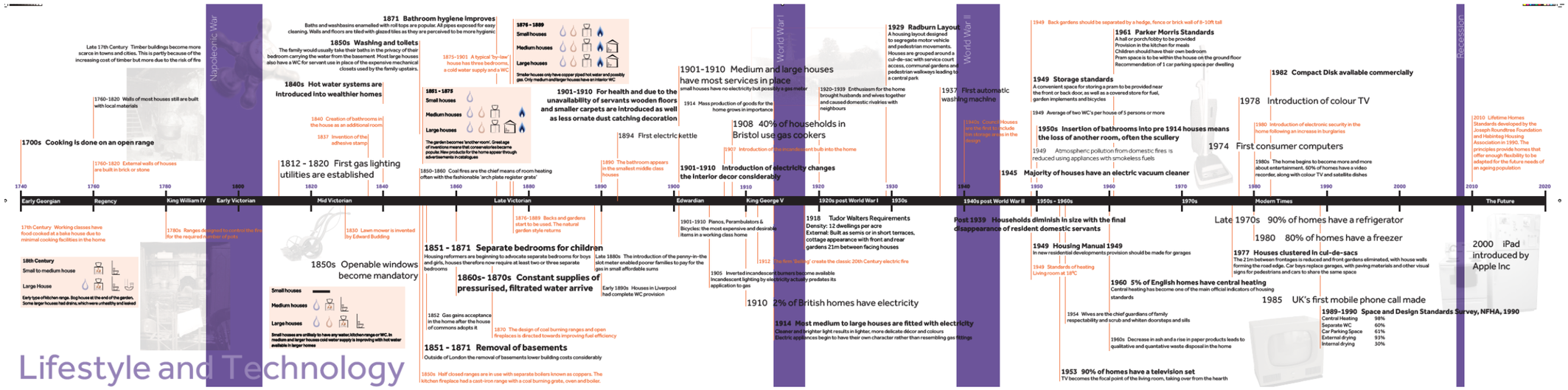

Figure 46 Lifestyle and Technology Timeline

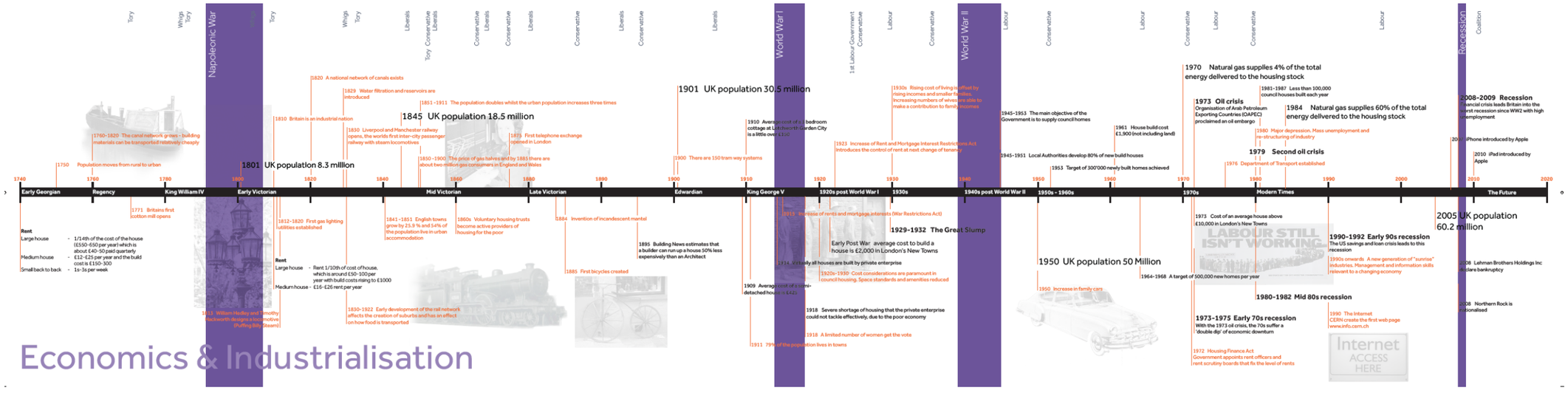

Figure 47 Economics and Industrialisation Timeline

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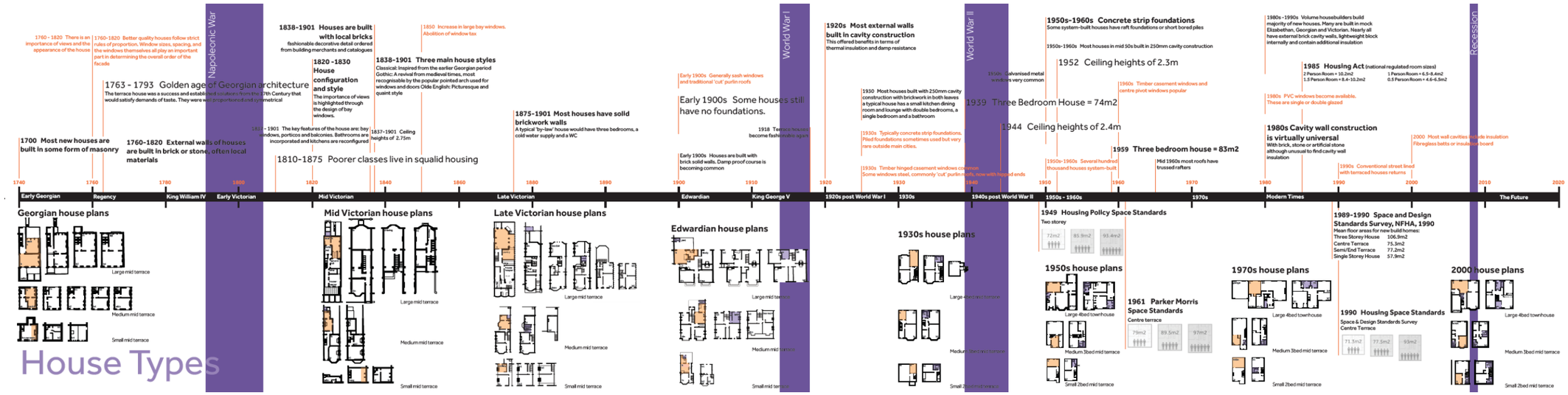

Figure 48 House Types Timeline

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13 Appendix B – Not-at-present-in-use-maybe-never-again Objects: A Participatory Exhibition

13.1 Description

A participatory exhibition engaging the general public was designed to capture how material possessions had impacted on the use and experience of the home, so that a new perspective on the ordinary could be unearthed, by understanding how material possessions are currently impacting the way we inhabit our homes. The exhibition was advertised regionally through the Architecture Centre's network, the local newspaper (see Figure 26) and social media (Facebook and Twitter), and the general public was asked to submit auto-photographs of their material possessions, displayed or stored away. The general public were the participants. They were specifically asked to send photographs showing the experiences and activities that are connected to the storage capacity in their homes and the items that they store. Initially, forty-eight photographs were collected online via the www.housingmattersuk.com website. These photos were then displayed over seven weeks spanning March and April 2014 at the Architecture Centre Bristol in an exhibition entitled '*Not-at-present-in-use-maybe-never-again objects: DEAD STORAGE'* (see Figures 49 and 50). During this time, more photographs were received and added to the exhibition, and by the final day of the exhibition there were over two hundred and thirty-four photographs, of which one hundred and seventy-two were exhibited from one hundred and seven participants. The photographs recorded how the inhabitants saw the everyday collections of material possessions within the home, at a particular moment in time. The researcher understood that the participant is not an objective recorder, but a subjective one. However, the photographs were seen as a tool through which the participants expressed their perceptions of the everyday collections of *'stuff'* and how they were impacting the physical space of their homes. They gave a glimpse of how material possessions and storage practices have impacted (positively or negatively) on the use and experience of the home. For example, some of the photographs showed special and valuable personal collections that people wanted to show or display for

others to see (Figure 27) in their homes. Other photographs showed rooms, especially garages, under-stairs cupboards and attics, inundated with material possessions that are no longer used (Figure 28). Figure 30 captures the itemisation that took place in relation to some of the emerging themes.

Once all the photographs had been itemised, six initial groupings were identified *('topical coding')* (Richards, 2015), as shown in Figure 29. The first grouping took into consideration material possessions associated with specific rooms and spaces (e. g kitchen, garage, attic, etc.). The second grouping showed whether the possession was hidden away or displayed (e.g. collections of mementoes, valuables, special significance, etc.). A third grouping showed the cycles of activities in which possessions were used (e.g. seasonal, daily, long-term, etc.). One of the observations about this grouping was that very few photographs showed material possessions that are used daily, such as the milk bottle, the plate, the glass, etc. The forth grouping contained material possessions related to a specific point in the life of inhabitants (e.g. the pram or cot when children are small). The fifth grouping showed material possessions related to maintenance and repair (e.g. sewing box, workshop tools, DYI tools, etc.) and the final grouping that emerged was related to archival possessions, those possessions that might be useful at some point in the future, but currently are not (e.g. cables, mobile chargers, old kids' swimming pool, unpacked boxes, files, etc.).

The exhibition became a piece that transformed itself through commentary, discussion and visualisation, where a domestic reality was unveiled. The general public, photographer and participant, became the protagonist, where a truly hidden reality of the architectural space of the home was revealed through an interactive design event. The event brought a new perspective to the ordinary, by using photographs of material possessions that are generally hidden away from the public, and only seen by invited guests or the household. It captured concrete categories of *'stuff'* in the totality of the home, and gave an insight into where people keep their *'stuff'* and the extent to which material possessions were taking over the spaces in rooms, thereby adding to the body of knowledge on housing.

The continuously changing participatory design exhibition systematically presented the growing collection of photographs of *'stuff''*, conveying a domestic reality where the home is portrayed as a *'container'*. The exhibition was constructed around a standardised box frame, like the utilitarian IKEA boxes that aim to apply order to the chaos of our possessions.

This part of the study was part funded by EPSRC (under a Bridging the Gaps grant to foster interdisciplinary research), and by a UWE internal grant (Vice-Chancellor's Award). Furthermore, in order to secure the exhibition in the Architecture Centre, Bristol, a proposal to the yearly programme of events was put forward, and reviewed favourably by its Board.

13.2 Photos of the Exhibition

Figure 49 Participatory exhibition at the Architecture Centre, Bristol.

Figure 50 Participatory exhibition at the Architecture Centre, Bristol.

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14 Appendix C – Undressing UK Housing: An Architectural Model and a Peer-reviewed Journal Paper

14.1 Photos of the Finished *'Undressing UK Housing'* Model

Figure 51 Regency House. Photo reproduced with permission © Justine Frost.

Figure 52 Edwardian House. Photo reproduced with permission © Justine Frost.

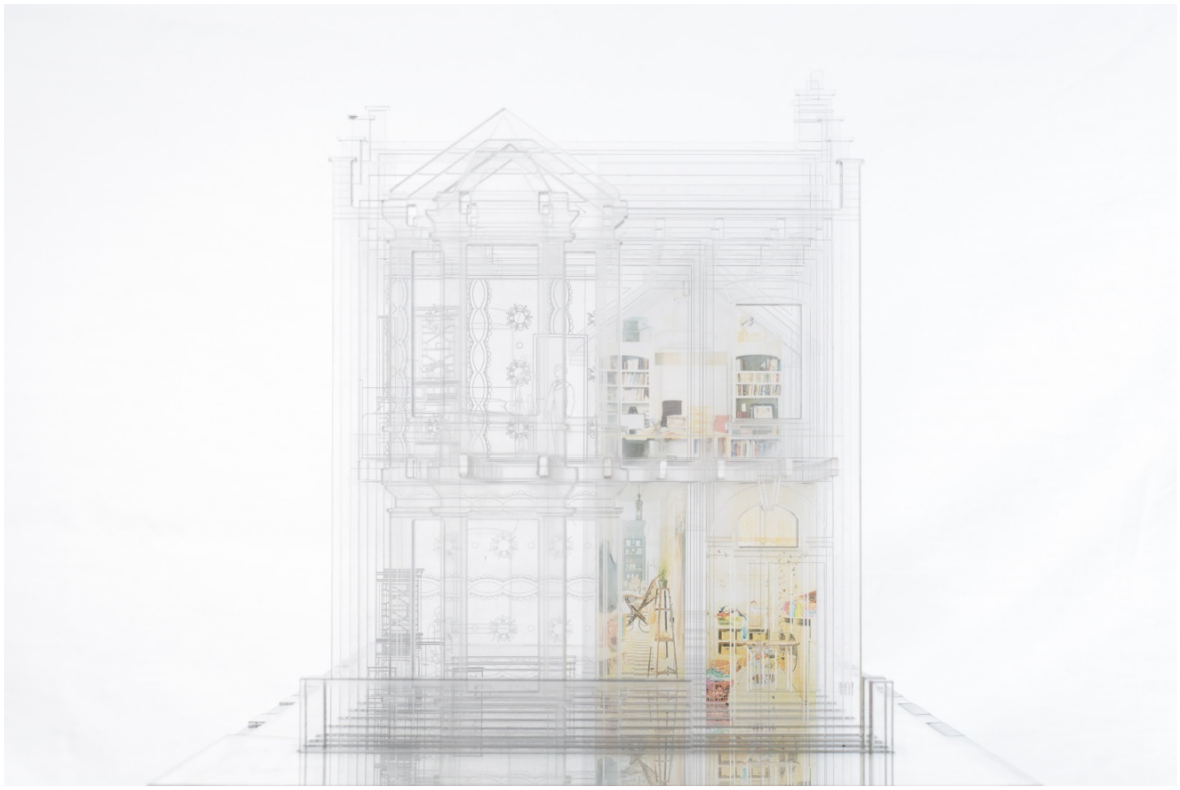

Figure 53 Victorian House. Photo reproduced with permission © Justine Frost.

Figure 54 Modern House. Photo reproduced with permission © Justine Frost.

14.2 Peer-Reviewed Journal Paper

This section contains the Accepted Manuscript version of an article forthcoming in *The Design Journal* (Print ISSN:1460-6925; Online ISSN:1756-3062), copyright Taylor & Francis, available online at doi:10.1080/14606925.2021.1949237.

Title The Architectural Model as Augmenting a Sensory Ethnography

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Key Words Architectural design; design research; sensory ethnography; design process

Abstract

This study provides an exploration of the effectiveness of the architectural model as a means of implementing a sensory ethnographical research methodology. An architectural model, constructed as part of a wider design research approach, became the visual probe in a site-specific participatory 'place-event' with field experts. Using physical objects in sensory ethnography is well established, however, the application of architectural models in this methodological approach has not previously been documented to the authors' knowledge. The architectural model was shown to be an effective visual probe, a means to implement a sensory ethnography research methodology in the field of architecture. Furthermore, the site-specific nature of the event generated a site-specific conversation that would not have occurred in a more conventional context. The event also made a valuable contribution to the field of architectural research, by demonstrating that a model can challenge the design of a research project from different perspectives, in a similar way to how architectural models challenge the design of buildings. The research described in this paper is part of a wider study, that examines the relationship between material possessions and housing design, and the findings were used to refine the use of visual probes in the later stages of the wider study.

Introduction

In emerging ethnographic research practices, a multisensory approach has been identified as central to understanding people's lives and experiences in both academic research and practice (Pink, 2007; 2009). The new and more dynamic ethnographic practices currently being explored go beyond traditional observational approaches (Pink, 2007; Pink, 2009; Dicks, 2014). For example, an ethnographic approach with visual material can become an effective tool for generating evidence that other methods, like interviews or surveys, cannot, since they lack the visual materials needed to provoke a specific targeted reaction (Rose, 2012). These multisensory ethnographic approaches are generating new debates and arguments, shaping new empirical studies and practice-led interventions in wide-ranging fields of study (Pink 2004; Pallasmaa, 2005; Tilley, 2006; Edvardsson and Street, 2007) and therefore generating new knowledge.

In the field of architecture in particular, the making of models as visual aids is part of the design process that helps bring together theory and practice (Dunn, 2007; Smith, 2004). Architectural models are often a physical representation of a design (be it a working-, presentation- or conceptual-representation) created as part of the design process (Smith, 2004; Driscoll, 2013; Burry et al., 2007). For centuries, visual materials have been used as part of the design process itself, as well as used to communicate designs to others, such as clients or the wider community (Smith, 2004; Burry et al, 2007; Driscoll, 2013). When presenting their designs to others, architects are being held accountable (Luck, 2004) and the visual materials help challenge the design from different perspectives. As a consequence, changes to the design emerge, that would not otherwise have been considered. This paper argues that visual materials in the form of architecture models also have an important role to play in a research context, helping to frame a design problem from a specific perspective to encourage creativity and innovation.

Participatory events have been used to generate new knowledge, by revealing common themes and stimulating thoughts that at times can be difficult to articulate (Park, 2007; Hemmings et al., 2012). Therefore, this study uses a participatory design event with field experts, using a site-specific setting, in this case the kitchen, to test the effectiveness of implementing a sensory

ethnographical research methodology in the field of architecture by using an architectural model as a visual probe. Such events can create a thought-provoking record that can benefit the researcher's reflection of their own research (Hemmings et al., 2002). In this way, a sensory ethnographical methodology is augmented with an architectural visual probe, constructed using a design research method.

The model was created as part of a wider design research study investigating the evolution of a critical, exploratory and reflective enquiry into the relationship between material possessions and housing design. The architectural model captures the historical changes and present characteristics of today's domestic space, in both the physical space of the home and in the use and experience of the space itself. The novelty of this study comes from the fact that the architectural model in particular has not yet been tested in the context of a sensory ethnography intervention in architectural research.

This paper begins by situating the model within the architecture design discourse, to explain how the model was created as part of the wider study. This is followed by an explanation of how the specific sensory ethnographic methodology was applied, to test the effectiveness of the model through a site-specific participatory event. Key architectural precedents are also identified, so the approach taken can be understood in context. The background to the development of the methodology is then contextualised. The observations, drawings and recordings of the event are then summarised and thematically analysed, and reported along with the authors' own critical reflections on the process. The paper concludes that the architectural model was an effective visual probe, a means to implement a sensory ethnography research methodology in the field of architecture. Using a site-specific 'place-event' had merit, as the specific location generated site-based conversations that would not have occurred in a more conventional context. Finally, the event made a valuable contribution to the field of architectural research, by demonstrating that a model can challenge the design of a research project from different perspectives, in a similar way to how architectural models challenge the design of buildings.

Situating the model within the architectural discourse

As part of a wider study to capture the historical changes and present characteristics of today's domestic space, in both the physical space of the home and in the use and experience of the space itself, an architectural model was constructed to bring together past and present qualities of domestic space.

Two historic events, the Smithsons' 'Design for the Future Home' and Andre Jaques' 'IKEA Disobedient', were used as inspirational precedents (Van Den Heuvel and Risselada, 2004; Jaque, 2011; Godfrey, Chimmel and Todoli, 2014). These events have been hugely influential in testing approaches to housing design, and have shown how users of domestic space could be engaged in a discussion about the ideas presented, changing their attitudes and preconceptions. These investigations of the use and experience of domestic space, explored through prototype models with consumers as participant-observers, are the foundations on which the architectural model for this study was constructed. The representation of design thinking as part of the making of architecture is the most important operation that articulates theory and practice (Dunn, 2007). The model is the medium by which 'certain relevant characteristics of the observed reality' (Echenique, 1974) are enhanced and abstracted. When creating the model, it was necessary to be highly selective of the information that it contained (Dunn, 2007). It is left to the maker, (in this case the first author), to identify the relevant features for abstraction.

Day (1994) and Peeck (1987) commented on the beneficial role of 3D models to engage participants in participatory events, as they help communicate specific characteristics that keep the participants engaged. Salisbury (1998) cautions against maximising the level of detail that a 3D artefact might have, as well as the quality of its construction, since this can have a negative impact on the event if the object is considered 'art'. Therefore, the level of detail of the architectural model was chosen with care to communicate effectively without distraction.

Situating the model within a sensory ethnographic methodology

Design Research is considered to be an inquiry, in which design takes a significant role during the research process (EAAE, 2017). Design Research is a reflective practice in which the architect-designers develop complex solutions to a research question (Hauberg, 2011). This reflective practice goes through a process of critical assessment, comparability and evaluation, using sketches, diagrams and models as part of an iterative problem (Thomsen and Tamke, 2009). These visual expressions are representations of cognitive processes that visualise things in a different way to words (Hauberg, 2011). The architectural design process, when used as part of Design Research, ensures that new insights, knowledge and practices that evolve are validated by peer review (Hauberg, 2011).

Sensory Ethnography, on the other hand, is a methodology established as a means to understand people's lives and experiences (Pink, 2007; 2009; 2011). This methodological approach can benefit architects, as it can give an insight into the priorities of the future inhabitants that they design for (Cranz, 2016).

Visual ethnographic methods generate visual materials (probes) as a way of exploring research questions (Rose, 2014). The researcher becomes central to developing visual material, and in some instances the participants also generate visual material themselves (Pink, 2009; Rose, 2014). The visual material produced needs to be analysed by the researcher and is '…*used actively in the research process, alongside other sorts of evidence generated usually by interview or ethnographic fieldwork*' (Rose, 2007). Wallace et al. (2013) state that the use of probes is not only a tool for design, but also a tool to explore a specific aspect of design in a targeted but responsive way, which leads to deep reflection and stimuli for design. The visual material can become more emotional when combined with dialogue (Bagnoli, 2009; Rose, 2014), as it can channel a sensory experience of an environment (Banks, 2008; Pink 2009; 2011). The method can be even more effective when combined with interviews or focus groups (Bagnoli, 2009; Rose, 2014), which allow the researcher to explore the things 'taken for granted' in the experiences of the participants (Rose, 2013) and can reveal hidden aspects as part of the research inquiry (Knowles and Sweetman,

2004). Scarduzio, Giannini and Geist-Martin (2011) argued that the principles of ethnographic research are similar to an architectural blueprint, in that the ethnographer becomes the architect that joins together the ethnographic '*attributes*' in order to create their own '*architectural blueprint*'. The ethnographer as the architect continues to reflect through observations, conversations, interviews and drawings, in order to make sense of their enquiry.

In this study, the architectural model, constructed as part of a design research approach, became the means through which an exploration of how a multisensory ethnographic methodology can be implemented to aid design thinking in the field of architecture. Therefore, this paper presents a novel combination of a design research methodology with a supporting sensory ethnography, both explorative and reflexive, as well as iterative and dynamic. The architectural model becomes the central element within both methodological approaches, since they both use visual probes as means of exploring specific aspects of the research. Others have included probes as part of a methodological approach in the past (Boehner, Gaver and Boucher, 2014; Hemmings et al., 2002), using '*domestic*' or '*cultural*' probes, but to the authors' knowledge, an architectural model has not yet been tested in this context. Both methodological strategies involve the researcher-architect in the development of iterative and explorative visual probes (Boehner, Gaver and Boucher, 2014). In this particular study, the visual probe is the architectural model that had been created following a design research methodological approach. The model was then used to enact a reflective dialogue through a site-specific participatory place-event between the researcher–architect and field-experts, creating what the author refers to as a '*visual ethnography of the design process*'.

The making of the architectural model

The architectural model had to articulate the narrative of the past and present qualities of domestic space in relation to the 'stuff' that is accumulated and the physical space of the home, as well as the changes to domestic space over time. Titled '*Undressing UK Housing*', the model

captured what lies behind the public face of the house through time. The model used historical and current information from two distinct phases of the wider research study. First, it used the historical information collected as part of the overarching study exploring the major changes in UK housing over the last 200 hundred years (Marco et al., 2013). The study showed a historical dimension to the concept of domestic space and provided an illustration of the change in the priorities and functions of space in the home. The study highlighted the disconnection between storage space provided in our homes and the amount of material possessions that a household contains. Secondly, it used a thematic analysis of the 234 photographs that were collected as part of a participatory design event exhibition at the Architecture Centre, Bristol, UK (Marco and Burgess, 2014). The photographs showed a glimpse, during a particular moment in time, of how possessions were impacting the physical space of the home, giving insights into how inhabitants saw the stuff that occupies their homes.

The model took the form of the four most common terraced-house typologies in the UK: the Regency, Edwardian, Victorian and the Modern house. These encapsulate the times in history when housing demand was at a peak (Muthesius, 1982; Ravetz, 1995). Each period was deconstructed into twelve layers, each made of 5mm thick laser-cut acrylic, and each layer was divided into two halves: left and right (see top-middle and top-right of Figure 1). One half of each layer was carefully laser-etched to represent the past. Looking through the twelve layers together created a three-dimensional effect of how it would have been to live in the house during that period. The repetitive nature of the layers was a reminder of the cyclic nature of the everyday.

The other half was collaged, using images from catalogues and magazines printed onto acetate and glued onto the acrylic, to represent a more contemporary domestic space. These carefully constructed collages (Figure 2) were designed using the findings from the analysis of the photographs collected though the participatory design event exhibition. Six-themes emerged from this analysis: possessions associated with specific rooms and spaces (e. g kitchen, garage, attic, etc.), possessions hidden away or displayed (e.g. collections of mementoes, special

significance, etc.), cycles of activities in which possessions were used (e.g. seasonal, daily, long-term, etc.), possessions related to a specific point in the life of inhabitants (e.g. the pram or cot when children are small), possessions related to maintenance and repair (e.g. sewing box, DYI tools, etc.) and archival possessions that might be useful at some point in the future but currently are not (e.g. mobile chargers, old kids' swimming pool, unpacked boxes, etc.). The collages showed a layering and juxtaposition of objects, creating a series of fabricated spaces that represent today's domestic space and its accumulated possessions, by presenting the six-themes identified in the analysis. A key precedent was Richard Hamilton's photomontages (Godfrey, Chimmel and Todoli, 2014; TATE, 2006; Stonard, 2007; Hamilton, 2004), where he constructed architectural spaces in which material and technological possessions took centre stage.

The past (etching) and the present (collage) cohabited the architectural model to illustrate their influence on today's domestic spaces. Colourful contemporary collages collided with ghostly etched acrylic to communicate a reality of the everyday at a given point in time. The combined collection of four models, that were to be read as one, gave an overview across both time and space, with the static physical framework of each period home contrasting with the dynamic array of objects and activities they contained.

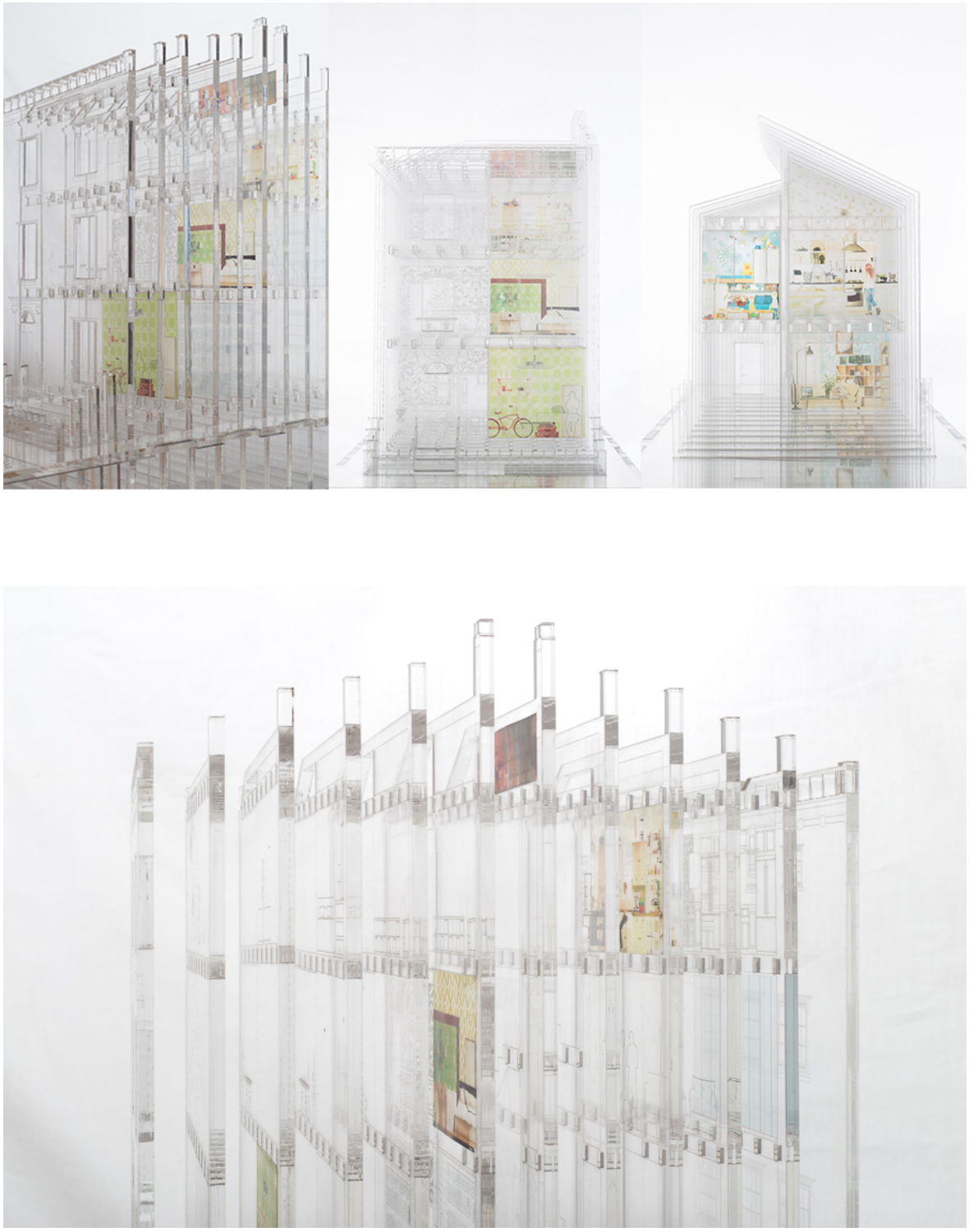

Figure 1. 'Undressing UK Housing' architectural model.

Figure 2. Example of the model collages.

Testing the Model in the Context of the Methodology

Participatory events capture common themes and stimulating material from the experiences of participants and can generate new knowledge (Park, 2007; Hemmings et al., 2012). Their purpose is to changes people's experiences through an event that reveals hidden aspects of common issues that are difficult to articulate (Park, 2007).

For this study, a design event was created as a reflective participatory event, in order to test the effectiveness of a sensory ethnography methodology using an architectural model. It was important to explore the efficacy of the architectural model as a visual probe.

Therefore, five experts, known to the researcher, were invited to take part in the reflective design event. They were chosen for their expertise in using design research and visual ethnographic methods. Five was seen as the maximum number of participants that could comfortably fit in the chosen physical space, and is in line with the group size recommended by Morgan (1998) when the topic for discussion is complex. Their expertise encompassed the fields of Architecture, Photography, Film and Architectural History. They were asked to engage in a critical discussion of whether the architectural model added to the sensory ethnographic methodology.

Prior to the event, a pack was sent to each participant, containing a written and photographic summary of the study so far, along with information on how the event itself was to be conducted and recorded. The summary covered the project methodology and explained how an architectural model was to be tested in this context. At this stage the participants were asked to reflect on the methodological approach taken. Three blank A5 cards were also included, on which the participants could reflect, record and sketch their thought processes beforehand, based on the briefing.

The experts then came together, led by the researcher to ensure the brief was followed (Figure 3). The model was placed in a specific domestic space, in order to create a 'place-event', where the research narrative could be enhanced (Pink, 2009) and to strengthen the dichotomy

between the reality of space and its abstraction (Figures 5 and 6). By placing the model (a '*domestic probe*') inside a physical domestic space (Hemmings, et al.2002), the event was designed to provoke a reflective dialogue amongst the participants, so that the effectiveness of methodological approach could be tested.

The kitchen as a domestic space has been explored in the literature as a place where material possessions and their associated practices come together (Miles, 1998; Pink, 2004; Sutton, 2006; Shove et. al., 2007). The kitchen, within the domestic context of a '*sensory home*' (Pink, 2004), becomes the intersectional node of human and material activities (Shove et al, 2007). Therefore, for this study, the kitchen was chosen as the ideal place in which to carry out the reflective participatory event.

The reflective discussion started with a thirty-minute briefing, where the background to the project was outlined and questions arising from the briefing pack were addressed. The briefing started as a dinner-table discussion that included the sensory experience of eating and enacting a conversation (Figure 3). It was held in a lounge area, separate from the main place-event kitchen where the model was situated. The construction of the model and its meaning had been introduced as part of the briefing, but at this point the participants had not yet seen the model. The participants were able to ask questions and discuss some of their thinking that had already been captured on the blank A5 cards in the briefing pack. Once the briefing was concluded, the participants moved to the kitchen area, where the model, placed centrally, (Figure 4) was revealed to the participants. At this stage the participants were asked whether the model communicated the use and experience of domestic space over time as intended.

The event lasted two hours from start to finish. The dialogue was recorded and photographed, and written notes were taken by the researcher as participant-observer. The photographic recording of both the event and the model was an important additional means of capturing the dialog beyond the event itself. All this information was then thematically analysed. Figure 5 shows the five stages of the method that was used in the study. First, the participants' sketches

and notes were analysed to identify the efficacy of this methodological approach to deliver innovation in architectural design. The sketches and notes principally focused on the process by which the model was created. This theme was then expanded by analysing the audio-recordings and the first author's notes, which captured two further themes: the effectiveness of the architectural models augmenting a sensory ethnography and the use of a kitchen as a 'place event'.

Figure 3. Participants being briefed in the living area as part of the domestic event.

Figure 4. Placing the architectural model in the context of the kitchen.

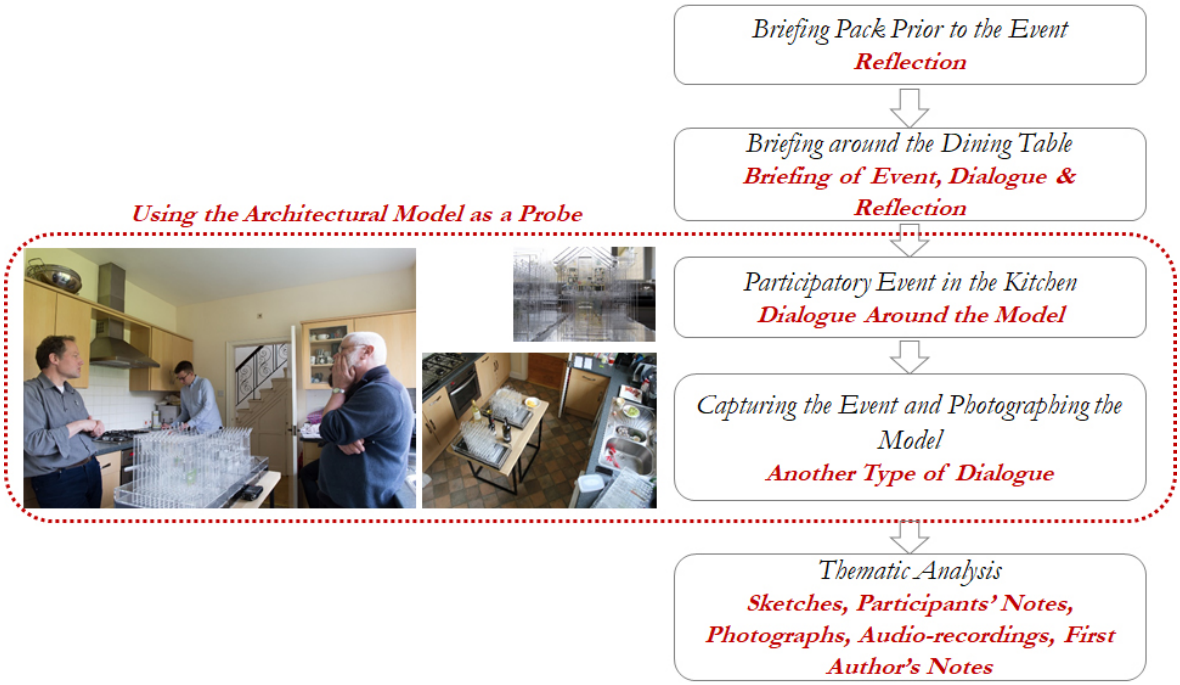

Figure 5. The five stages of the method.

Discussion

The findings presented below have been drawn from the thematic analysis of the reflections from the participants and each theme is discussed in turn.

The architectural model as augmenting a sensory ethnography

The question of whether the architectural model was effective in augmenting a sensory ethnography methodology was explored by the field experts. All field experts were overwhelmingly positive. The architectural model was successful in creating and promoting a critical dialogue amongst the group (Figure 6). The model was observed from different angles and heights during the event, creating a dynamic and engaging dialogue (Figure 6). The model also generated personal moments, where three of the participants in particular discussed where they have lived in the past, as the physical form of the model took them back to their personal experiences.

Based on the range of topics and depth of the discussion that the model generated, the participants agreed that an architectural model could positively contribute to a sensory ethnography. However, the consensus was that, within the wider study, it should 'not be this

model'. They felt that the model examined was too 'beautiful and structured' and 'too crafted' to contribute to the methodology. They concluded that a different type of model, where the 'illegitimate' elements of the research were expressed, would be of more benefit, because people would not be afraid to touch it, move it and even change it as part of the dialogue.

Differences of opinion arose, however, when discussing what type of model would be most suitable for the wider research study. In order to communicate the use and experience of domestic space in relation to material possessions, two possibilities emerged from the discussion. One suggestion was to use a 'larger-scale, less detailed model of space', in which participants might 'play' at placing various items of 'clutter'. Another suggestion was to use a 'digital' or 'cinematic' model that could be morphed with time so as to become temporal, like material possessions are themselves. A theme that kept occurring was the importance of playfulness as a means of engaging the participants that take part in the sensory ethnography.

Figure 6. Participants during the domestic event.

‘I don't necessarily agree with [Participant A] that a digital or cinematic representation of space would help. For my part, I would be very interested in seeing you develop a larger-scale, less detailed model of space (we called it a 'cardboard box' model) in which participants might 'play' at placing various items of 'clutter'. This would address what I believe is the very important distinction between 'architectural' space (the spaces represented by architectural photographers, or even the IKEA catalogue) and 'cluttered' space.’

Participant D

‘I am very attracted to the idea of a 'game' in which participants can 'play' at placing clutter within a model.’

Participant A

Once the group agreed that the model had a role within the sensory ethnography, the researcher noticed that participants began to draw and animatedly discuss the design of the ‘other model’ (Figure 7). This raises an interesting question about whether the model should be ‘wrong’ on purpose, in order to stimulate a discussion about what the ‘right’ model should look like.

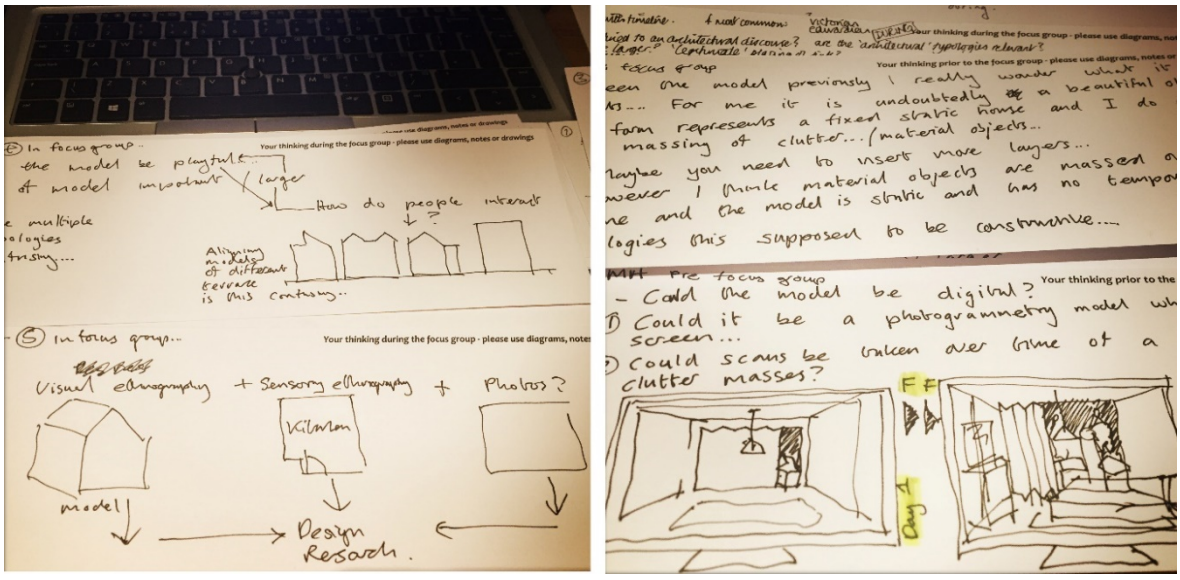

Figure 7. Sketches and notes taken during the event.

There was an agreement that the 'other model' should be designed and constructed with the 'various items of clutter' derived from the already collected photographs, and that it also needed an element of 'play'. In order to include the clutter in a methodological manner, the experts felt it was important that the collected photographs led to the creation of a 'taxonomy of stuff'.

> 'When I say 'various items of clutter', I am thinking these might be derived from a detailed analysis and taxonomy of your photos. You say you have a very large sample of these - maybe they could be classified into categories such as 'dirty' or 'clean'; 'useful' or 'symbolic'; 'contained' or 'dumped' etc. etc. You could then use your groups to better understand how these various forms are accommodated within the home.'
>
> Participant E

It is interesting to note that, about half way through the event, the participants came to the realisation that, as a group, they held very specific expertise and their dialogue was 'very academic' in relation to the methodology. They questioned whether 'a much more practical discussion', involving the inhabitants themselves (non-experts), would lead to different conclusions about the suitability of the model for this methodology. This is an important point, which the researchers will need to consider in more detail as the wider study progresses.

The kitchen as 'site-specific'

The merit of using a kitchen as the site specific 'place-event' in which to hold the discussions was seen as overwhelmingly positive by the participants. During the event, the participants acknowledged that the location generated a different conversation than that which would have taken place in a more academic or architectural practice-based space. The kitchen itself was also used as part of the discussion, and the participants drew parallels between the '*real*' kitchen and the '*fabricated*' spaces of the model.

The food that had been shared as part of the briefing process was transported to the kitchen, and the dialog continued to develop into a format that could be compared to a dinner-table conversation. As time went on, the model was changed, touched and moved, despite them suggesting earlier that its crafted nature made them reluctant to do so (Figure 8). Towards the end of the discussion, one participant even found some bottles of alcohol in a kitchen cupboard and moved them amongst the models to bring them closer to a 'real' kitchen context – the authors would like to make it clear, however, that no alcohol was consumed during the event.

Figure 8. Photographs of the kitchen after the domestic event finished.

The photographic recording of the model, during and after the event, was also considered an important part of this methodology. The photographic recording was seen as a method of further dialog, something already considered by the Smithsons back in the 1950s (Van Den Heuvel and Risselada, 2004; Godfrey et al., 2014). The model was also photographed by the photography field expert after the event. The photographer tried to stay truthful to its highly aesthetic value, by capturing the essence of the research project and analysis, as well reflecting the discussions that took place during the participatory event. The final photographs

of the model after the event became very architectural, flattened 2D representations that captured the depth and 3D nature of the artefact, adding to the recording of the dialog through the photographs themselves (Figure 1).

Pallasmaa (2005) and Tilley (2006) advocate for a multisensory approach to architecture. This study has implemented a multisensory approach in a different context by using an architectural model in a kitchen as a catalyst to provoke a critical debate.

Analysing the process by which the model was created

The value of making as a way of thinking through design was seen by the field experts as beneficial for this study. It was therefore suggested that it would be a good idea to construct different models for different purposes and different audiences, so the multisensory ethnographic methodological approach could be further tested in this context.

One of the weaknesses of the model, from an architectural perspective, was that whilst it was a 3D object, its layers made the information seem flattened, recorded and 'stored', and it therefore lost its three-dimensionality. The elaborate crafting of the model was also considered distracting, as the physical fabric of the building was more readable than its '*stuff*'. However, the experts agreed that the model had characteristics that '*start to work when* [the model] *describes the* [historical] *peculiarities of space*' like the high ceilings or original features, and that it shows how the space would be used today through its fabricated collages.

Both the model and the collages were viewed as carefully constructed spaces that record and store the progress of the wider study, showcasing how the project has developed, and trying to abstractedly communicate the research findings so far. One expert argued that the model had done its job within the context of the study and now needed to be archived.

> 'I would recommend you to 'archive' or 'park' the models as you presented them, although they are a valuable record of a key stage in your process.'
>
> Participant B

In contrast, two of the other participants saw the model becoming a valuable storage medium for the research and suggested the model should continue to be developed throughout the study in order to archive both the process and the findings, becoming a carefully constructed record of the research process.

> '… the model is something to read because it is visual….instead of reading a text you read a visual recording of the research'
>
> Participant A

The dichotomy between the 'perfect architectural model' and the 'imperfect reality' was discussed at length, especially within the architecture and architectural photography contexts. At this point, the participants engaged with the context of the kitchen and its contents by opening cupboards and drawing parallels between the 'stuff' in the kitchen and the content of the collages in the model. It was noted that when architecture is photographed, people and stuff are usually removed, 'but the house is brought to life when you add these things'. The participants debated whether, since the research aims to look at material possessions, this model is 'too legitimate', by which they meant too perfect or crafted. They concluded that the research needs an 'illegitimate model that rebukes architectural space'.

> 'Seeing an empty house, devoid of belongings and personal effects, is like seeing a skeleton. The life of a house comes from the presence of people within it, their possessions and the marks they make (wallpaper, paint, etc.)'
>
> Participant C

Therefore, whilst the model was considered beautiful, it was at the same time considered static, almost like a piece of art, albeit one which has value as part of the research process.

The participants agreed that continuing to explore the wider study through the construction of models (legitimate and illegitimate) would be of benefit to the researcher as a way of addressing the dichotomy between the architectural space (legitimate) and the accumulation and storage of material possessions (illegitimate).

Conclusion

The architectural model allowed an exploration of its effectiveness as a means to implement a sensory ethnography research methodology within the field of architecture. The very act of creating the model as part of the design research approach also required the processing and rationalisation of the findings of previous stages of the wider study, through critical reflection. The model gave an overview across both space and time, with the static physical framework of each period home contrasting with the dynamic array of objects and activities they contained. The model helped to synthesise information from disparate sources and provided a visual historical representation of that information. In this study, the model also tested the sensory ethnography methodology, augmented by a design research methodology, through a participatory event, in a kitchen –'place-event'. This captured new stimulating material to take to the next stage, especially informing the types of models that would benefit future research, and highlighting the importance of creating a 'taxonomy of stuff'. This brought a contribution to knowledge of how architectural probes should be designed and constructed to test research findings with architects, so these findings can contribute to architecture design thinking. The architectural model was effective as a means of implementing a sensory ethnography, however the construction of the model in itself brought questions about 'what model' would be appropriate.

Visual communication through 3D models helps to challenge architectural designs (Smith, 2004; Driscoll, 2013; Burry et al., 2007), and refinements to these designs emerge as a consequence. However, this study builds on this use of visual probes in architecture, by advocating for their use as part of a sensory ethnography methodology as a way of challenging the research process itself. This helps to frame the design of a research project from a specific perspective, encouraging creativity and promoting novel approaches.

Overall, the outcome of the 'place-event' was, in the view of the authors, a success. It led to a critical but rich discussion that helped re-think the wider exploratory research study within the context of this particular methodology. According to the participants, siting the model within a

real kitchen worked surprisingly well. Despite the array of evidence from the literature (Pink, 2004; 2009; Dick, 2014), there was still initial scepticism from the authors as to whether the informal and cramped nature of a real kitchen would be the right space to promote dialogue and discussion. However, holding the briefing in the dining area instigated a dinner-table type conversation amongst the participants that was rich, fluid, dynamic and reflective. This conversation continued when the event moved into the kitchen. Since the wider study is investigating the use and experience of today's domestic space in relation to material possessions, holding the event in a domestic space surrounded by material possessions allowed people to draw upon both the kitchen and the model to seek inspiration for their thoughts.

The idea of continually updating and adapting the model as a means to archive the research findings was thought to be inspiring. Since the research is about the accumulation and storage of material possessions in the home, it seems particularly apt to use the model itself as a way of accumulating and storing research findings. Not only will this allow the progression of the research to be recorded, but the very nature of creating the model will require the processing and rationalisation of findings through critical reflection. The model has also since served as a means of communicating the research findings to others through two carefully curated exhibitions.

The discussion on whether the focus of the model should be legitimate or illegitimate made the authors reflect on whether other types of models could be created as part of the wider research. However, it is important to decide whether these probes are just a design tool, or intended to engage participants in a critical dialogue. The experts themselves did not feel that this particular model was the most appropriate to add to a sensory ethnography. However, the dialogue and engagement it provoked in them, to talk about their own personal and professional experiences of material possessions in domestic space, makes the authors conclude that it has nevertheless added to the sensory ethnographic methodology. This study also identified the need to test out the model with non-experts, the inhabitants of the domestic spaces, to explore what type of dialogue it provokes in them.

In future research, where architectural models are used as part of a sensory ethnography, this study also suggests that it would be beneficial to get feedback from field experts on the design of the models to identify specific attributes that the model needs to have.

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15 Appendix D – Too Much Stuff and the Wrong Space: Peer-reviewed Journal Paper

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Title Too Much 'Stuff' and the Wrong Space: A Conceptual Framework of Material Possessions

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Abstract

Space for living in new build houses in the UK is at premium and households have more stuff than ever before. The way this stuff is accommodated in dwellings can significantly affect residents' quality of life and well-being. This paper presents a new conceptualisation of material possessions that could be of use to those involved in housing design. Three universal characteristics of material possessions; value, temporality and visibility are used to identify the space in the home that possessions might require. A conceptual framework that integrates these characteristics with spatial information about the interior of the home is developed. The paper argues that the conceptual framework could help designers, policymakers and house builders to better understand first the nature of material possessions, and second how those possessions could be accommodated in contemporary homes, ultimately supporting improved quality of life and wellbeing for households.

Introduction

Context

Material possessions can have an effect on peoples' wellbeing, physical and mental health, security and comfort (Cwerner & Metcalfe, 2003; Roster et al., 2016; Smith & Ekerdt, 2011). Over the last 60 years there has been a well-documented increase in the acquisition of material possessions (Carr et al., 2012; Hand, Shove & Southerton, 2007; Schor, 1998). At the same time, there has been a reduction of space in new housing in the UK (Park, 2017; Royal Institute of British Architects [RIBA], 2011; Williams, 2009). As a result, many households find that their material possessions overwhelm the spaces within their homes and affect their quality of life, health and happiness (Smith & Ekerdt, 2011). Empirical studies have shown that residents who perceive their homes to be over-loaded with material possessions can experience related stress reactions and low mood, sometimes leading to insomnia (Raines et al., 2015; Saxbe & Repetti, 2010).

The UK is currently in the midst of a national housing crisis, both in terms of units available and affordability (Department for Communities and Local Government [DCLG], 2017). The pace of housebuilding has not kept up with the household formation, and hence there is a recognised need to speed up the delivery of new homes (DCLG, 2017). Yet, one of the consistent criticisms of new housing is that it does not provide enough space for the storage/display of material possessions and that the space that is provided is not fit for purpose (Commission for Architecture and the Built Environment [CABE], 2005; 2009; RIBA, 2011). This paper argues that space for storage of possessions is an important aspect of housing design and that it needs more attention in the housing design process. Specifically, it argues that the design of new houses could be improved by understanding the nature of material possessions and how they interact with the physical space of the home. By thinking about possessions in a new way, those involved in housing design might gain a new perspective, leading to better-designed spaces in the home. Whilst the focus of this paper is the UK, these patterns are not unique to UK housing, and could be relevant in other countries in the developed world.

Despite the aforementioned growth in material possessions, and the established impact on living space, 'stuff' is largely overlooked in current debates on housing policy and design. There is little understanding of what households own, collect, store and dispose of, nor the implications this might have for domestic space design. Of course, a key issue is the variability in household types, patterns of accumulation and dwelling spaces, which make generalisations difficult. However, there is enough universality in the experience of increased accumulation combined with reduced living space that makes it worthwhile to look for a better understanding of the dynamics at play. Hence, this paper draws on existing literature to develop a new conceptual framework of material possessions and their relationship to space in the home. The framework focuses on three key characteristics of possessions: their value, temporality and visibility. It is hoped that this framework could be used to improve storage provision in new homes, ultimately improving residents' quality of life and wellbeing.

Scope

To set the context for the conceptual framework, it is useful to understand how space for possessions is handled currently in the design process, and also to be clear about the parameters of 'possessions' included in the study. When designing new housing, architects often use a set of standardised house types across a site (e.g. detached four-bedroom, or two-bedroom apartment). These standardised types have a limited number of specific material possessions already considered within the design. Furniture such as a bed, sofa or dining table, will be considered and their space pre-allocated in the plans for the house. In this paper, this 'already considered' furniture is not addressed. The 'material possessions' considered are the items and objects that make up the range of 'stuff' that a person or a family unit accumulates through time, and have in their house, that is not generally planned for or accommodated as part of a standardised house-type layout. These possessions could be clothes, ornaments, sports equipment, collections, photographs and so on. Perhaps surprisingly, such material possessions have rarely been classified, or their characteristics identified, within the literature, and in

particular, there are no classifications specifically targeted at informing the design of spaces in the home.

The material possessions that a person owns, not only facilitate the activities that take place in the physical spaces of their home (Shove et al., 2007) but are also intrinsically linked with the inhabitants' self-identity, personal values and biography (Belk, 1988; Miles, 1998; Pink, 2004; Richins, 1994). Material possessions accumulated during all periods of life, facilitate the inhabitants' lifestyle, and the physical space of the home facilitates the inhabitants' life (Miles, 1998), which in turn impacts on wellbeing (Smith & Ekerdt, 2011). For example, ordering and tidying the physical space of the house has been found to have an effect on both the well-being of the inhabitant and the physical space of the house (Raines et al., 2015). Furthermore, different material possessions support different lifestyles at different points in people's lives.

Storage, within the context of this paper, is understood to be a fundamental dimension of inhabitants' inter-personal relationships and lifestyles. It facilitates order, both physically and mentally, and affects happiness and wellbeing (Cwerner & Metcalfe, 2003; Smith & Ekerdt, 2011). Storage can be seen as traditional shelving, cupboards and racks, but can also be attic storage rooms or outside bin spaces. When the physical spaces of the house are over-whelmed with material possessions (clutter), and the storage space is inadequate, it affects inhabitant's experiences of their home environment and has a detrimental effect on their quality of life (Saxbe & Repetti, 2010).

In housing design currently, space for living in is at premium, as housebuilders reduce the size of houses to address profit margins, development costs and housing demand (Mayor of London, 2010; Williams, 2009). This has led to the UK having the smallest newly built houses, and the smallest sized rooms, in Europe (CABE, 2009). In addition to being small, research has shown that the UK's homes also have inadequate storage provision (CABE, 2005, 2009; Karn & Sheridan, 1994; RIBA, 2011). In fact, storage is considered a key weakness of modern housing design (Mayor of London, 2010). Part of the problem seems to be that space for storage is not

highly valued by prospective house buyers when purchasing a home. However, inhabitants often report subsequently that there is not enough storage for their possessions (CABE, 2005, 2009), as the space has been reallocated to more marketable rooms like *en-suite* bathrooms. Clearly, it would benefit house buyers if more consideration was given by those involved in the housing supply chain to where and how possessions might be stored and displayed.

Nevertheless, little attention has been paid in practice or research to the accumulation of material possessions in relation to the (re)configuration the house's physical space (Hand, Shove, & Southerton, 2007). In addition, the location (of storage) of these possessions within the physical space of the home has been overlooked in the literature, not only in consumption theory research (Cwerner & Metcalfe, 2003) but, perhaps more importantly, in design best-practice guidelines (CABE, 2009; DCLG, 2015; RIBA, 2011). This paper addresses this lack of consideration of material possessions when designing homes, and that the limited space available in standardised house types, especially for storage, could be better designed to ensure the dwelling is fit for purpose over time.

Methods

In order to identify the characteristics of material possessions, and to explore how material possessions and storage impact the occupants' use and experience of the home, a literature review was undertaken. It focused on relatively contemporary sources to reflect current studies of material possessions in the home but drew on older literature to give historical context where appropriate. The literature search used the following keywords and phrases: 'material possessions', 'clutter', 'storage', 'storage practices', 'stuff', 'everyday practices' and 'home possessions'. It was carried out using SCOPUS, Google Scholar and the Social Sciences Citation Index databases. The initial searches indicated a number of core academic studies and 'grey literature' (Bryman, 2012) that were significant. This led to a pragmatic snowballing of the relevant references that helped conceptualise material possessions by identifying their characteristics (qualities) and categories (a set of shared qualities). The review drew from three core disciplines: sociology, anthropology and consumer research (including material culture).

While the core literature was drawn from these three fields, other fields such as marketing theory, psychology, architecture, planning and housing studies were also included as part of the literature review. However, there were far fewer studies in these areas, and those that did address material possessions (Oseland & Donald, 1993; Ozaki, 2003; Schor, 1998) focused on particular users, spaces or cultures. By encompassing such a range of literature, the study was able to make a series of connections across diverse fields of study, and select material that may have meaning to those involved in housing design (Noy, 2008).

Exploring the Characteristics and Categories of Material Possessions

Identifying the key characteristics of material possessions ensures a better understanding of the 'stuff' that people accumulate during their lifetime. There are a number of key studies where some classification has taken place with a sociological, anthropological and consumer research emphasis. From this cross-disciplinary perspective, and considering the relevance to house design, three main characteristics of material possessions have been identified. These are the value of the possession; its temporality and its visibility. The following three sections of the paper explain these characteristics in more detail, and articulate how they relate to 'domestic space.' The conceptual model is developed by layering and integrating an understanding of these characteristics and their spatiality.

The value of material possessions: Valued and de-valued

In the context of this study, value is understood to be the worth placed on material possessions by a person or a household. The value given by the owner (self) and others (society) drives the categorisation.

Categories of value in material possessions

A significant body of research on material possessions focuses on their value and meanings (Csikszentmihalyi & Rochberg-Halton, 1981; Dittmar, 1991; Richins, 1994). The seminal study by Richins (1994) examined 'important and valued' possessions, and attributed public or private 'meanings' attributed by society or oneself respectively. Objects with utilitarian value (e.g. plates)

provide something that is needed, as opposed to objects with enjoyment value (e.g. tennis racket) that facilitate a pleasurable activity. Other types of objects represent interpersonal ties (e.g. mementoes) and have historical, symbolic or sentimental meaning, or have identity and self- expression value (e.g. wedding ring). Additionally, objects might be of financial importance (e.g. antiques) and/or have and appearance-related value (e.g. clothes).

More recently, Marcoux (2001) studied material possessions in the context of moving home, when the people moving house must decide what is essential, what could be put into storage and what can be thrown away. Similar to Richins (1994), Marcoux (2001) identifies 'obvious' possessions, like crockery and glasses, which are needed for day-to-day practical or utilitarian activities, and 'important' things, that are valuable (either financially or sentimentally, as 'mementoes'). For both Richins (1994) and Marcoux (2001), material possessions' values change over time, be it for practical, sentimental or financial reasons. In these studies, the specific time in the life of the inhabitant has an effect on how valuable, or not, certain material possessions might be. The value of material possessions in the home can therefore be seen as dynamic, and their classification must be linked to the specific moment in the life of the inhabitant, as well as to what is fashionable or not.

Just as some possessions can have a high 'value', others can become de-valued too. Possessions can be seen on a spectrum, which has significance for how they are dealt with in the home. De-valued items often still occupy the physical space of the home: their value may have diminished, but they are not completely worthless.

Addressing these issues, Thompson (1979) classified material possessions as 'durable', 'transient' and 'rubbish', depending on how they were valued. 'Durable' possessions (such as antique pieces of furniture) increase in value and have an infinite lifespan. Items that are 'transient' (such as a mobile phone) relate to trends, and their value will mostly decrease with time until they have zero- or unchanging-value, they become 'rubbish' and are thrown away. Marcoux (2001) identified possessions that 'might be useful things', like old pullovers, which could be utilised at

some future time, as well as possessions 'of little importance,' like left-over medicines, which can be thrown away.

Building a conceptual framework for housing design: Valued and de-valued possessions

From the literature, material possessions characterised by their value can be categorised as: *'utilitarian, for enjoyment/pleasure'* if related to activities*, 'symbolic/sentimental' (inner-self)* when related to interpersonal ties*,* and *'appearance or personality of one-self' (external self)* when related to external identify (see the second and third columns in Figure 1). When material possessions aid an activity, they can be part of a utilitarian or pleasurable activity; for example, a tin opener is completely utilitarian when used indoors, whereas as an item of camping equipment is part of a pleasurable activity conducted outside the home. On the other hand, when a material possession reflects the identity of the inhabitant's self, it can enhance external appearance and self-expression that reflects inhabitants' own personality, or it can strengthen the internal self-identity related to familial or friendship ties, sources of pride or success, or strong sentimental value. For example, a designer leather bag could reflect the owner's external personality, whilst a family photo could reinforce personal and sentimental history. Therefore, material possessions related to inner-identity will be associated with values of sentimentality and self-identity, whereas material possessions related to external identity will have values related to appearance and personality (see the third column in Figure 1).

Obviously, the above categorisation is a simplification of a complex situation, and material possessions could have value in more than one category, but often their value in one category will be dominant. The value attributed to an object is subjective, will vary from person to person, and will also vary over time.

The categories of de-valued possessions can be conceptualized as: *'of little importance', 'might be useful,' 'objects with potential,' 'objects to be transferred to,' 'things that will never be used'* or simply *'rubbish'* (see the shaded box in Figure 1). If a material possession loses value over time and becomes redundant, be it aiding an activity or enhancing the inhabitant's self-image, it is placed in a

'holding' space while the inhabitant reassesses its value and decides if it is to be thrown away or has the potential to regain value. At present, such redundant possessions dominate spaces like spare bedrooms, attics, cellars, sheds, garages or even off-site storage units. They usually put significant pressure on space.

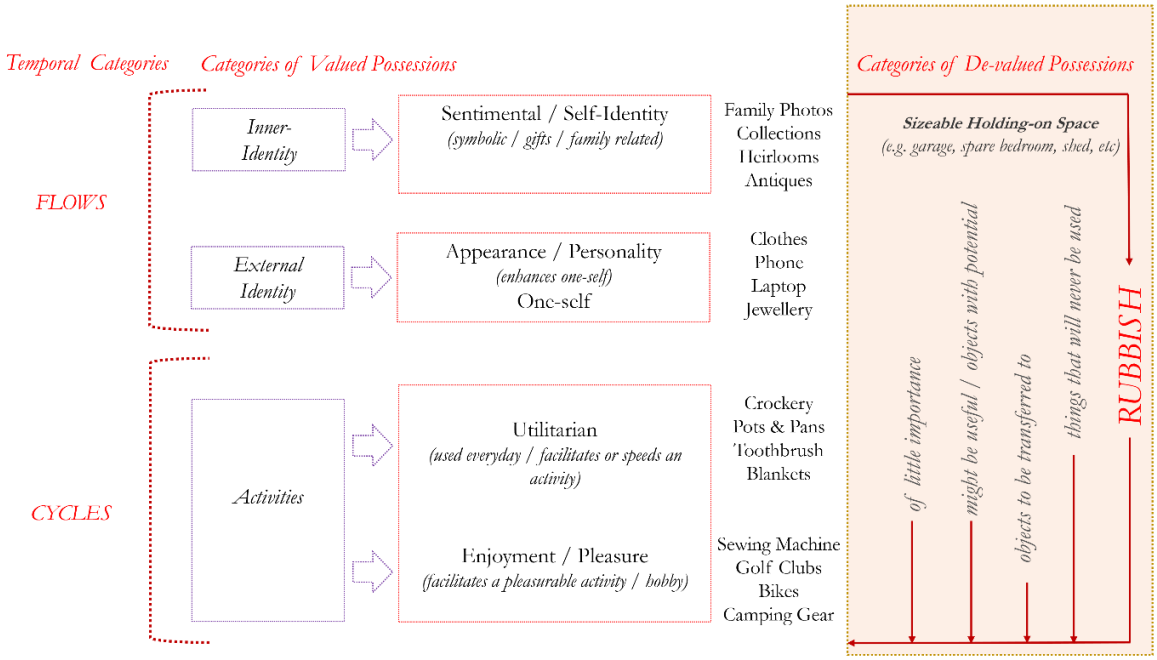

Figure 1. Categories of valued material possessions

Temporality of material possessions: Cycles and flows

The frequency of use of possessions will influence where it is placed or stored. Material possessions in the home are influenced by two temporal categories: 'cycles' of time, and 'flows' of time (see the left-hand column of Figure 1). Cycles are driven by daily or weekly routines, and seasonal or annual changes in living, and are therefore directly related to activities that take place in the home. Flows, on the other hand, are unidirectional and related to changes in life, lifestyles, fashion trends, technological advances, sentimental values, and so on.

Cycles of time as a temporal category of material possessions

Pink (2012) identified material possessions as part of a short, medium or long-term cycles of activity. 'Stuff' moves through cycles of space, transferring from one space in the home to another (Cwerner & Metcalfe, 2003; Shove & Southerton, 2000) based on the cyclic nature of the activities that take place there. Activities such as cooking, eating, socialising, playing, entertaining, working, studying, and sleeping facilitate a contemporary way of living that requires spatial cycles with a wide range of time-periods.

Some storage areas hold material possessions that aid a regular activity, such as eating, drinking or cleaning, and these associated possessions will only need to be stored for a few short cycles before being consumed and discharged (Hirschman, Rubio, & Belk, 2012). Other material possessions go through cycles of 'tidying, sorting and storing' in the home. For example, Laermans and Meulders (1999) explored these cycles through activities linked with the laundry process of wearing, collecting, washing, drying, ironing and storing. Such possessions also need space to be stored whilst their medium-term cycle is completed (Hirschman, Rubio, & Belk, 2012). Those that are part of a frequent routine tend to be stored close at hand, whereas those of infrequent longer-term cycles are often stored further away from the activity.

In addition, the cycles themselves are not static, and the time taken to complete a specific cycle may well change as lifestyles change. They are also dependent on the specific cultural and socio-economic make-up of the inhabitants and external fashions (Shove et al., 2007). Each change may require a reconfiguration of the physical space of the home to accommodate it (Hand, Shove & Southerton, 2007). Through storage practices, space is organised and clutter (material possessions in a state of untidiness) kept under control to allow the cycles of activities to take place (Hand, Shove & Southerton, 2007).

Flows of time as a temporal category of material possessions

Householders' lives and lifestyles change over time, requiring different types of material possessions that will need to be accommodated within the physical space of the home. There

are also flows related to possessions that are valuable and have an emotional or financial attachment for an inhabitant. Such possessions have been referred to as 'sacralised' (McCracken, 1986) or 'symbolic' (Chevalier, 1998), as they are full of memories (e.g. baby clothes, special gifts). These possessions require a phase of 'desacralisation' (McCracken, 1986) or 'desymbolisation' (Chevalier, 1998) as the personal meanings they hold begin to fade.

Flows are also influenced by changes in contemporary ways of living and are often driven by technological innovations (e.g. latest appliances), which lead to timesaving devices that help synchronise the activities that take place in the home. Figure 2 shows the results of a desktop study of historical literature, describing how the number of electrical appliances has increased over time whilst the storage capacity of the houses has reduced.

Hand, Shove and Southerton (2007) explore the flows related to technical innovations, where new technological appliances replace other material possessions or need to carve themselves a space in the home in order to accommodate a contemporary way of living. All these objects in themselves become temporal and ever-changing within the physical domestic space (Shove, 2003) and are supporters of the household activities—they can save time and effort. However, they also require a complex infrastructure to sustain their function, for what is sometimes a very short lifespan with considerable space implications.

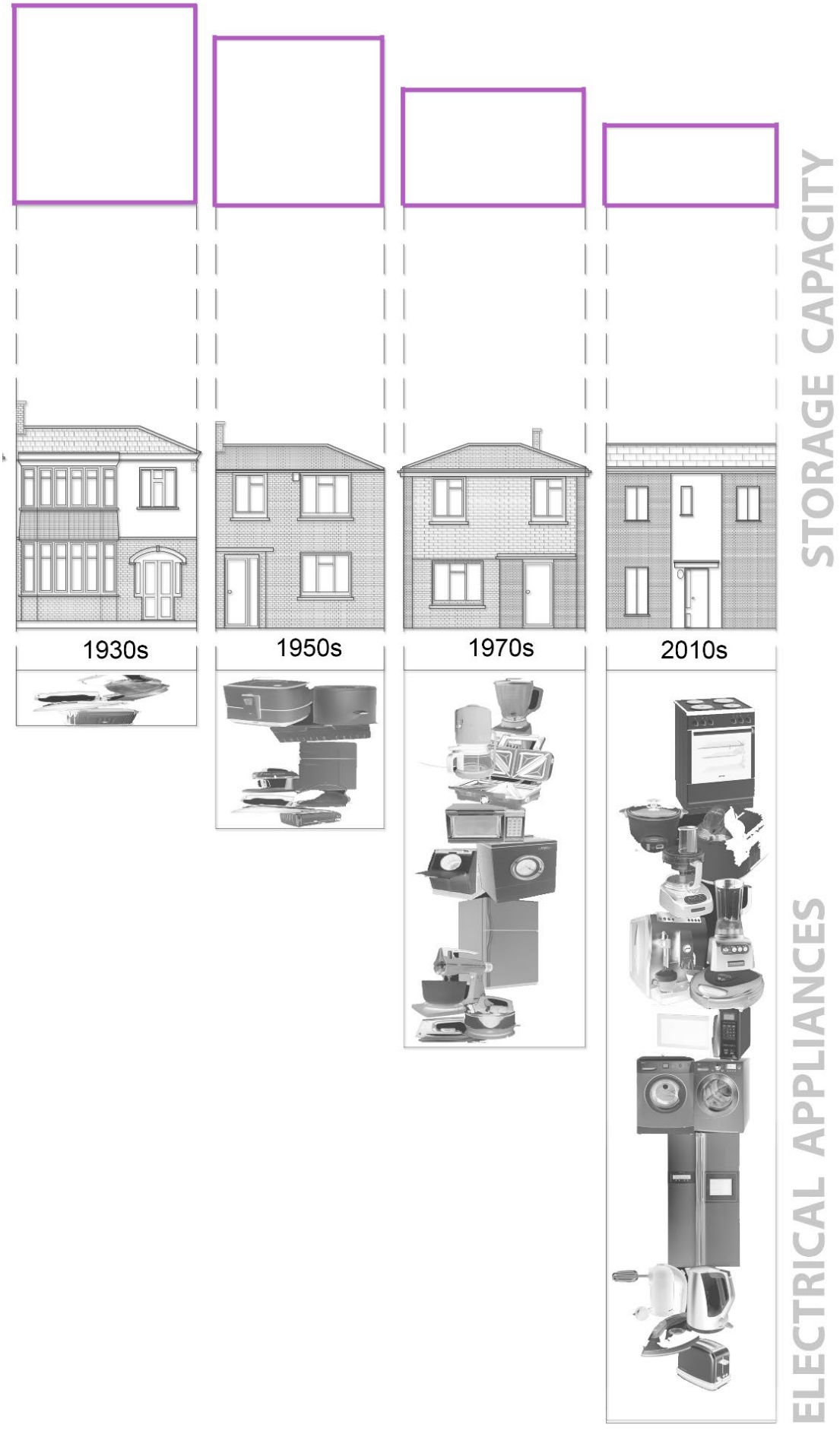

Figure 2. Storage capacity versus electrical appliances in houses

Every material possession related to technological innovation is in itself subject to flows of fashion, where the latest trends and the 'right' possessions to bring social standing are craved, be they gadgets, appliances, tools or toys (Schor, 1998). Moreover, what is 'a must have' this season may well be out of fashion once the next trend takes hold.

Building a conceptual framework for housing design: Cycles and flows

The location of material possessions within the home will depend on the cycles and flows (temporal categories) they undergo. Material possessions that aid either a utilitarian or pleasurable activity will also be specifically related to its associated cycles. Cycles of utilitarian possessions are generally associated with activities that take place within the home, whilst pleasurable possessions can be linked with either internal or external activities. Material possessions related to an activity will be part of the short, medium or long-term cycles (Figure 3 blue horizontal axis) depending on the frequency of use.

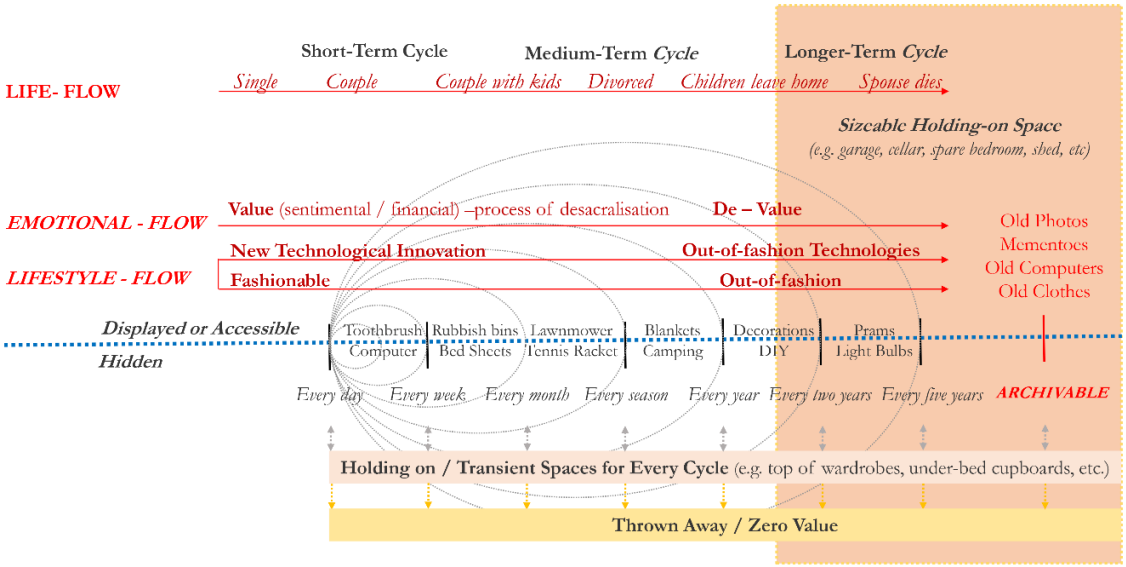

Figure 3. Cycles and flows related to activities

Material possessions primarily related to the internal and external identity of the inhabitant's self are more sensitive to flows of time (see unidirectional flows in Figure 3). The flows related to those possessions that change due to the changes in the lives of the inhabitants and household compositions are referred to here as '*life flows*'. Similarly, flows related to personal, sentimental or financial values that change over time and are associated with the inhabitant's internal-identity are referred to as '*emotional flows*'. '*Life*' and '*emotional*' flows are influenced by who the inhabitants are and what value they give to a particular possession at a specific time in their lives. Flows related to external identity are driven by fashion or technical innovations that can change over time, referred to here as '*lifestyle flow*'. Even material possessions associated with cycles will still flow over longer periods as they wear out or go out of fashion. For example, a utilitarian possession like the iron aids a weekly activity of laundry, but over time will lose value as it gets older until finally replaced.

'*Life flows*', '*emotional flows*' and '*lifestyle flows*' all have material possessions associated with them and help communicate aspects of inner-identity, as well as how the inhabitants want to be seen (external identity). Therefore, careful consideration of space and time synchronisation and the sequence of key activities needs to be considered, as well as the impact of '*life flows*', '*emotional flows*' and '*lifestyles flows*' on space over time.

The visibility of material possessions: Displayed or hidden

The visibility (or not) of material possessions is the final characteristic identified from the literature. The valued or de-valued material possessions that are part of cycles and flows of time, will either be displayed or hidden away within the physical space of the home, depending on the inhabitants' identity, socio-economic, cultural, demographic and personal values.

Displayed or hidden as visibility categories of material possessions

Contemporary spaces within today's houses have evolved to become multi-functional and versatile, catering for an array of activities (Hand, Shove & Southerton, 2007) that require space for storage in order to display or hide these possessions away. However, some such spaces, like

the living area or the kitchen, still carry historical values and norms related to utility and status (Ozaki, 2003). Laermans and Meulders (1999) identified 'front' and 'back' spaces within the home, labelled 'visible' and 'invisible' by Thompson (1979). For example, spaces like the fashionable open-plan living room bring to the forefront of the home (makes visible) activities such as cooking that, in the 19th century, were related to the 'back' (private/hidden) spaces (Ozaki, 2003). Hence, the demarcation of activates carried out in each room has changed. Rooms like the bathroom are associated with very specific activities, but bedrooms, living areas and even kitchens now host a wide array of activities, such as sleeping, working, playing, studying or entertaining (Oseland & Donald, 1993).

Homes contain a host of material possessions that are intrinsically linked to household identities. Some of these possessions are likely to be on display and others hidden away from view. For example, Hecht (2001) carried out an in-depth case study of women's memory and its relation to material possessions. He argued that when possessions are significant and displayed, they are related to one's personal or sentimental attachments and interests in life (Hecht, 2001), and others reinforce this (Dittmar, 1992; Lury, 2011).

Similarly, the way households display their belongings varies in relation to their culture, beliefs, social identity, status or success (Daniels, 2001; Lury, 2011; Richins & Dawson, 1992). In some cases, the domestic space has areas, or even entire rooms, that display possessions related to identity and culture. These spaces can be motionless and unused but become showrooms when visitors come (Daniels, 2001).

The amount and type of value given to possession will determine whether or not it is on display. For example, those who have strong family values will showcase family photos of key moments, whilst those valuing success might display specific artwork as symbols of status (Ozaki, 2003). Therefore, the decision to display or hide a possession in a house will depend on the composition of the household and the values they want to put on show. If a material possession loses value over time and becomes redundant, be it one that aids an activity or enhances the

inhabitant's self-image, it is placed in a 'holding' space while its owner reassesses its value and decides if it is to be thrown away or has the potential to regain value to be displayed. In many contemporary homes, such redundant possessions dominate spaces like the spare bedroom, attic, shed or garage because there are insufficient designated spaces in which they can be stored or 'held-on' to (see the right side of Figure 1).

Building a conceptual framework for housing design: Space for hidden and visible storage

Within any new house, space for storage of these categorised possessions needs to be provided, to bring order to the cycles of activities within the home, and to the '*life*', '*lifestyles*' and '*emotional*' flows. This storage will be hidden away or displayed depending on the value given by the inhabitant or household.

Material possessions supporting activities will require specific space for storage, depending on the frequency they are used. In frequent cycles, there is likely to be a hierarchy of importance that leads the inhabitant to decide as to whether the possessions are displayed or hidden. In less frequent cycles, the possessions will be hidden or stored in 'holding on' spaces (Hetherington, 2004), before they are used again or thrown away (see the bottom of Figure 3).

When an activity that is associated with a specific room occurs as part of a cycle, the frequency of that cycle will be crucial in determining how and where the associated objects should be stored. It is helpful if the material possessions that are used in short or medium-term cycles are stored within the room that the activity takes place in. The mix of short and medium-term cycles that will take place in each room can then be supported by the necessary level of storage specific to each type of cycle. Material possessions associated with short-term activities can be stored in easily accessible places, and those associated with medium-term cycles can be stored in less accessible spaces. Some material possessions associated with long-term cycles are still associated with a specific room. However, the infrequent nature of their use means that they could be stored elsewhere: for example, storing Christmas decorations in the attic (Figure 4).

There are also activities that are not associated with a specific space within the home, such as vacuum cleaning, or are associated with a space outside the home, like sports equipment. Material possessions associated with these types of activities do not need to be stored in a specific room, but the frequency of their use could still dictate how easily accessible they are and will require a house-specific storage solution (see the right column in Figure 4). The vacuum cleaner could be stored in any room but would need to be able to be accessed in a hurry when something is spilt, whereas a pair of skis could be hidden away anywhere until winter. A range of specific storage solutions for these types of activities throughout the house needs to be carefully considered. Therefore, when considering the storage for material possessions related to the activities, a hierarchy of room- and house-specific solutions could be considered (see two right hand columns in Figure 4).

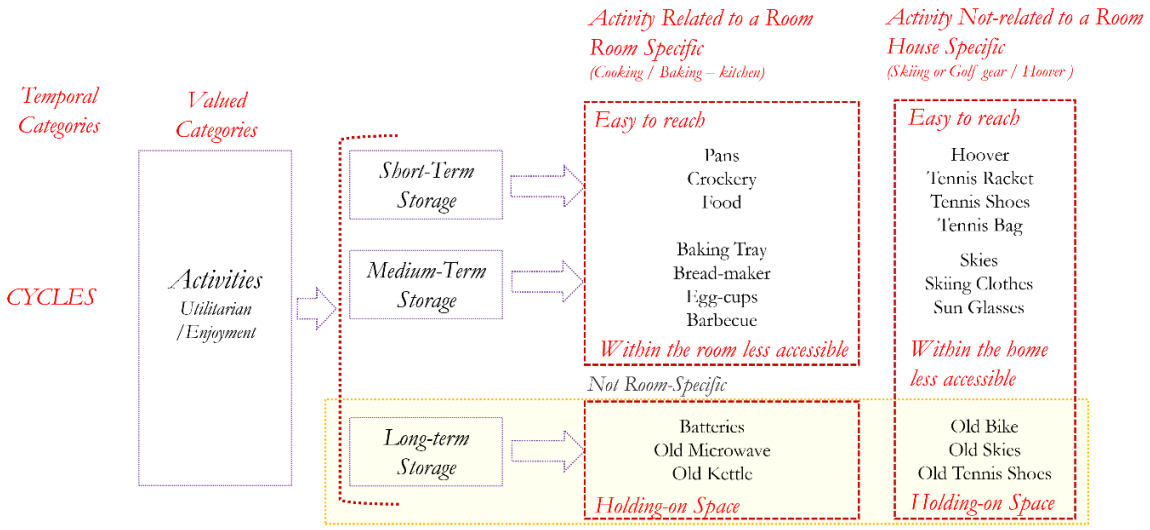

Figure 4. Storage strategies related to cycles of activity

Material possessions that become critical in helping define the inhabitants' self (internal self) and how they want to be seen by others (external self) are associated with flows. The flows will influence when these possessions are used, stored away or displayed and will need a different approach to storage, again, depending on whether or not they are associated with a specific

room in the house. As with cycles, the possessions related to these flows have a duration over which they will de-value and become obsolete and need dedicated spaces accordingly (hidden away).

Material possessions that reflect the inhabitant's inner identity are more likely to be influenced by the '*life flows*' and '*emotional flows*'. These possessions, such as a personal photo of a loved one, could well be kept in a specific but private place (privately displayed), or displayed on the mantelpiece in a public part of the house to share the object with visitors (publicly displayed). Material possessions that have high sentimental value, such as old photo albums, are not related to a specific place and can be stored anywhere in the home, in the same way as objects related to long-term cycles of activity (see the top half of Figure 5).

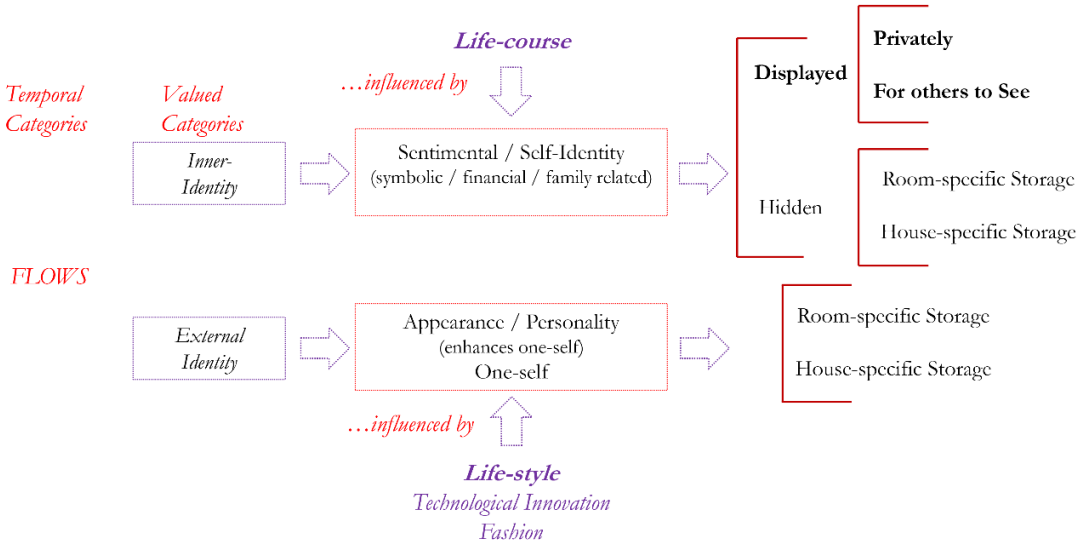

Figure 5. Storage strategies related to flows

If a material possession loses value over time and becomes redundant, be it one that aids an activity or enhances the inhabitant's self-image, it can be placed in a 'holding' space while its owner reassesses its value and decides if it is to be thrown away or has the potential to regain value. Financial value has a small additional influence on how material possessions are stored.

Some expensive objects, like jewellery, will need to be stored in a secure place like a safe, whilst other such possessions, like original artwork, might be exhibited within the house as symbols of status, despite a potential security risk. Some material possessions, such as inherited antiques, are identified as increasing in financial value over time, despite not necessarily being valuable at present (perhaps they are not yet very old, or are not to the inhabitants' taste), and so are stored away out of sight until their value increases to the point where they are sold or put on display.

Sentimentally valued collections (with or without financial value) that are part of a householders' identity, need to have space to be displayed. There are usually areas within the home that are more accessible by visitors, where some of these collections can be publicly displayed, whilst other more private collections can be displayed in areas solely for personal enjoyment (see the top right of Figure 5). Such collections can put notable pressure on space and need to be considered beyond the minimums suggested by design guides, with perhaps a mix of premium storage for the most valuable items and less visible storage for possessions that have lost some value through desacralisation.

Lastly, there are material possessions related to inhabitants' external identity. These are more likely to be influenced by the '*lifestyle flows*', such as technological or fashion trends (see the central column in Figure 5). These possessions reflect the external identity of the inhabitant and could be kept in a specific room or be part of a house-specific storage space. These possessions differ from person to person and will always relate to how inhabitants want to be seen by others at specific points in their lives.

When possessions become de-valued, spaces such as the attic, garage and spare bedroom become holding spaces for transitional material possessions, instead of maintaining the original use for which they were designed. Therefore, storage spaces could be provided in each room (room-specific storage), and in the house (house-specific storage) for those de-valued possessions, as well as a clearly identifiable and sizable holding-space for the de-valued possessions (long-term storage). By having carefully designed storage at room and house level,

as well as having identified clear long-term storage, spaces can be ordered, sorted and tidied ensuring the space is not inundated by 'stuff' and the household activities can be carried out. This brings physical order to the space and mental order to the inhabitant, therefore aiding the physical and mental wellbeing of the inhabitant.

Figure 6 brings together the universal characteristics and categories of material possessions identified from the literature. The diagram also articulates strategies for the design of storage, at room level and house level, in the home.

Conclusions

This study has brought together, for the first time, the sociological, anthropological and consumer research literature (Csikszentmihalyi & Rochberg-Halton, 1981; Dittmar,1991; Hand, Shove & Southerton, 2007; Richins,1994) to develop a conceptualisation of material possessions in the form of a new conceptual framework for housing design thinking. By identifying key characteristics (qualities) and categories (set of shared qualities) of material possessions, the paper explores a new approach to housing design, where the impact of material possessions on the physical space of the home is considered.

Figure 6. Overall conceptual framework of material possessions

By using this framework, architects, policymakers and even house-builders, can evaluate and adopt a new approach to housing design that considers the implications for storage in homes, especially when space is at a premium. Therefore, the impact of material possessions on the physical space of the home, as well as the location of storage for these material possessions, is presented as a new perspective for consideration in the housing debate. Considering space for storage in the design of new houses could help householders avoid cluttering the space and therefore impact positively in their wellbeing.

Value, temporality and visibility have been identified as influential in the characterisation of material possessions. This conceptualisation is driven by the values attached to different possessions, be they given by the owner or by others (society). Material possessions can be categorised as such for design when valued as aiding utilitarian or pleasurable activities, or when shaping our inner and/or external self. These possessions will be displayed or hidden away, depending on the inhabitants' culture, beliefs, social identity, and status. The utilitarian or pleasurable activities that take place in or out of the home are part of short, medium or long-term cycles (frequency), are intrinsically linked to specific material possessions that aid the activity, and which consequently move from one space to another at specific synchronized times. On the other hand, material possessions primarily related to the internal or external identity of the inhabitants'-self are more sensitive to the flows of time, be they '*life flows*', '*emotional flows*' or '*lifestyle flows*'. Whilst material possessions have previously been associated by others as being part of cycles in time, this paper has also identified material possessions as being part of unidirectional flows in time.

Material possessions need relevant and carefully designed space for storage. However, this space is not a priority addressed in the most recently published design guides, regardless of the importance placed on such spaces in the more historic guides (Building Research Establishment, 1993; MHLG, 1961) and in the cross-disciplinary literature presented in this study. In addition, material possessions that help build inhabitants' inner or external identities have been

overlooked in both historical and current design guides, whilst in sociological, anthropological and consumer research fields they take the centre stage.

For valued possessions, the conceptual framework provides room-specific and house-specific storage strategies, both for material possessions linked to activities that take place in that room/house and for objects of sentimental or financial value that shape our inner and external self. Storage for material possessions driven by activities associated with short- or medium-term cycles needs to be appropriately accessible. Storage for objects of sentimental value needs to have varied visibility, depending on the room itself (be it public or private), and the nature of the object (internal or external status). Sufficient room-agnostic storage space must also be provided for material possessions associated with activities that occur over long-term cycles as well as those not associated with a specific room.

The conceptual framework was developed from a wide-ranging literature review. The majority of relevant studies were from developed countries and dealt with lifestyle and consumption cultures in largely capitalist societies. The purpose of the paper is to develop a framework that could provide insight and, perhaps, be useful in advancing design thinking in related housing models. Further investigations of the usefulness of the model in different geographical, cultural and socio-economic contexts are suggested.

Finally, the model suggests that sufficient storage needs to be provided for 'redundant' material possessions, which have lost value but cannot yet be thrown away, some of which should be within a specific room linked with the object. This would free-up spaces like the garage, shed, or utility room to be returned to their original function. These 'redundant' possessions are the ones that are overwhelming the spaces in the home (clutter) and will most affect the inhabitant's wellbeing, and therefore their consideration during design becomes critical.

The study places value on the design of storage within the limited space of todays' houses, especially that in standardised house types, in order to propose an alternative approach to housing design thinking that provides adequate spaces for the inhabitants and their associated

material possessions. These possessions define the inhabitants' values and self-identity and affect their well-being, comfort and happiness, and therefore it can be argued that storage practices should be brought to the forefront of housing design thinking. By including storage in the designers' agenda, architects can begin to consider material possessions related to the inner- and external-self, so the design of houses can truly facilitate the inhabitant's lives and lifestyles: a perspective that until now has not been considered in published design guides.

Older design guides have to some extent addressed the importance of the activities that take place in the home, and the need for sufficient space to be able to carry them out, by focusing on the type and frequency of activities that take place in the home (Building Research Establishment, 1993; MHLG, 1961). However, more recently, they have neither articulated the types of material possessions and their effect on the physical space, nor the flows that might influence their location at specific points in time. Similarly, they hardly ever consider the space required by those material possessions that improve the social status of an individual or family unit, nor those related to identity. In addition, the guides do not reference the importance of flows (fashion, technical innovation or lifestyles). Providing enough space for storage to enable the activities carried out by the inhabitants is not a priority addressed in the most recently published design guides (DCLG, 2015; HATC, 2006; Mayor of London, 2010) or housing policy (Disability Discrimination Act, 1995), regardless of the importance that extensive cross-disciplinary literature examined above and historic design guides places on the activities. Modern guidance considers basic everyday activities but does not yet provide sufficient space to carry out the activities nor to store the possessions that aid those activities. Even less consideration is given to those material possessions that help build inhabitants' inner or external identities. The conceptual framework presented here begins to address this design gap, and brings forward a design perspective to inform architects, policymakers and house-builders how to address the weakening functionality of the new houses that are currently being built, and at a time when the delivery of new housing is a priority.

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16 Appendix E – Prioritising Storage Practices: Peer-reviewed Journal Paper

This section contains the Accepted Manuscript version of an article published in *Interiority* (Print ISSN: 2614-6584; Online ISSN: 2615-3386). It was accepted for publication on 28/12/2020, and will be available online with a DOI.

Title Prioritising storage practices: a new approach to housing design thinking

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Key Words architectural design; design practice; housing design, material possessions; storage

Abstract

Inhabitants of UK housing have more possessions than ever, whilst space for living in standardised houses is at premium. The acquisition of material possessions, and how it affects both space and inhabitants' wellbeing, has not previously been considered in architectural practice or housing policy research fields. This paper addresses this gap, by exploring how practising architects design for the storage of material possessions in housing. For the first time, it places storage practices at the centre of housing design thinking, by engaging practising architects in a design intervention to explore original design solutions that support inhabitants' lives and lifestyles, and therefore their wellbeing. The study uses a new storage-focused conceptual design framework to seek design knowledge, to better understand how storage practices could be considered when designing. The findings have implications for design practice research, providing an account of how architects consider storage in housing design, drawing on novel design intervention methods.

Introduction

The acquisition of material possessions, and their impact on inhabitants' well-being and the physical space of the house, especially that for storage, have been overlooked in fields of architectural practice and housing policy. In sociological, anthropological and consumer fields, an extensive amount of research has been carried out on the acquisition of material possessions and its associated consumerism practices (Ditmar, 1991; Richins, 1994; Eastman *et al.*, 1999; O'Cass & McEwen, 2004; Hand, Shove and Southerton, 2007; Rojek, 2011). However, their impact on the physical space of the home has been largely overlooked. This study fills that gap in knowledge, and contributes to current research into architectural practice in housing design, by exploring how practising architects design for storage of material possessions. It focuses on the smallest range of housing units currently being built by UK developers, the standardised house types, to inform a more personalised and healthy approach to housing design that challenges current standardised housing design practices. These standardised house units tend to have rooms of the minimum possible size, and are developed to be used 'universally' in the developer's schemes, so that costs can be minimised. This house type is typically designed to accommodate a 'standard' range of furniture and kitchen / bathroom fittings, but not the myriad of material possessions that people need to accommodate.

Engaging with practising architects can drive innovative thinking and contribute to the architectural research practice body of knowledge, leading to practical implementation of original design solutions (Samuels, 2017; Eustance, 2018). And whilst the focus of this study is on the UK, it is equally applicable to other countries where space is at premium and the well-being of inhabitants is a priority.

The rising demand for housing in the UK, and its lack of affordability, has had an impact on the space provided for living (Williams, 2009; Morgan and Cruickshank, 2014). Current design practices are led by profit margins, development costs and housing demand, as well as the planning policies that govern the developments themselves (West and Emmitt, 2004; Williams, 2009; Mayor of London, 2010) and the design quality of houses, according to developers, is

maintained by using house types with tested specifications where architects have a very controlled input (Jenkins and McLachlan, 2010). While architects' research advocates for flexible housing as part of the future housing provision (Schneider and Till 2007; Wigglesworth, 2019), developers continue to build inflexible schemes where storage is hardly considered.

On the other hand, material possessions inundate the spaces within the home and affect the inhabitant's well-being, physical and mental health, security and comfort (Roster et al., 2015; Smith and Ekerdt, 2011; Shenk, Kuwahara, and Zablotsky, 2004; Cwerner and Metcalfe, 2003). Hand, Shove and Southerton (2007) acknowledged that the sheer accumulation of material possessions could explain the current demand for more space. The inhabitants' lifestyles are supported by the material possessions accumulated during their lifetime, while the physical space of the house facilitates their life at a specific moment in time (Miles, 1998; Smith and Ekerdt, 2011). Modern houses fit more small 'must have' rooms within the same footprint to support specific lifestyles (West and Emmitt, 2004) where the flexibility and functionality of the house is compromised. Storage design practices are given even lower priority, as more valued rooms, like the en-suite, take precedent, compromising space for living (CABE, 2005; 2009). Storage is considered within the context of this study to be the practice of ordering, sorting and disposing of material possessions in space and time. Storage is a fundamental but invisible dimension of the inhabitants' inter-personal relationships and lifestyles. It facilitates order, both physically and mentally, and affects well-being (Cwerner and Metcalfe, 2003; Smith and Ekerdt, 2011) and therefore the authors argue as part of this study that it needs to be at the forefront of housing design thinking.

As part of wider research concerned with how an understanding of material possessions can help inform spatial storage design, this study engages with practising architects to bring a new and much needed user-centred perspective on today's housing problem, namely the impact of inhabitants' material possessions on the physical space of the home. The study uses a new storage-focused conceptual design framework, developed by the authors from cross-field literature (Marco, Williams and Oliveira, 2020). Diagrams representing the framework were used

as probes to stimulate dialogue and the design thinking of practising architects (Marco, Williams and Oliveira, 2020). By exploring new approaches to housing design thinking from a storage perspective, architects were able to propose designs that support the inhabitants' lives and lifestyles, and therefore their wellbeing.

Methods

This research uses a visually ethnographic six-stage design-probe method with practising architects (see Figure 1). The method combined qualitative research, in the form of in-depth semi-structured interviews supported by visual probes, with a design event involving participants. The use of probes (Gaver, Dunne and Panceti, 1999; Wallace et al., 2013) in participatory design in architecture practice has been used before with residents (Luck, 2018), but to the authors' knowledge, not with the architects themselves. The use of visual probes creates a sensory experience (Rose, 2007; 2014), that provokes a reflective dialogue, interrogation and examination from a very specific perspective. In this case, how an understanding of the impact of material possessions on the physical space in the home can help inform the design of storage practices. Wallace et al., (2013) articulate that the use of probes is not only a tool for design, but also a tool to explore a specific aspect of design in a targeted but responsive way, which leads to deep reflection and stimuli for design, in this case with the architects themselves.

The design probes used in this study were in the form of four diagrams that articulate the characterisation and categorisation of material possessions, as well as the conceptual design framework developed by the authors from a cross-field literature (Marco, Williams and Oliveira, 2020) to be used when designing homes (see left hand side of Figure 1). This framework identifies value, temporality and visibility as core characteristics that drive the categorisation of material possessions into utilitarian and pleasurable possessions, or possessions that shape the inner and / or external self. While the utilitarian and pleasurable possessions are part of short-, medium- or long-term cycles (frequency), material possessions related to internal or external identify are more sensitive to unidirectional flows of time, be they 'life flows', 'emotional flows'

or 'lifestyles flows'. Finally, depending on the sentimental, financial or even aspirational value placed on the material possessions by the inhabitants, some of the possessions will be visible to themselves and others, and some will be hidden away from view. Strategies for the design of storage, at room- and house-level, are also articulated.

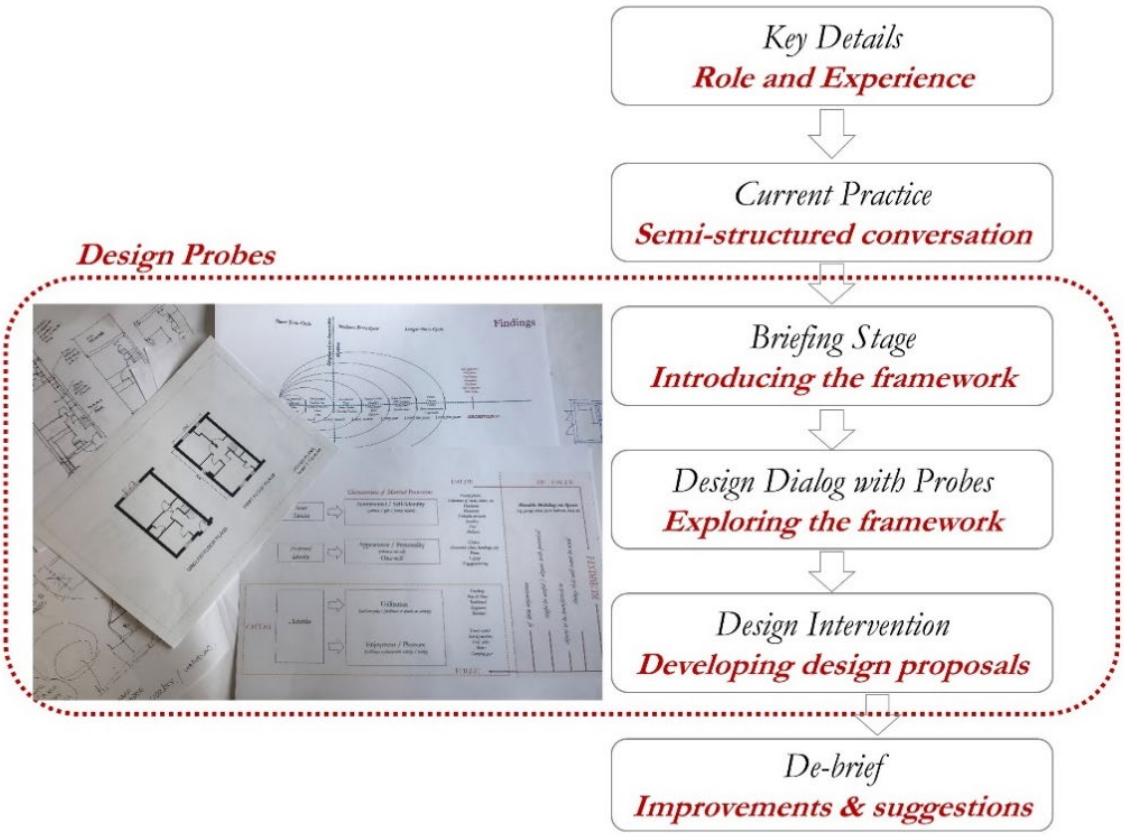

Figure 1: Ethnographic six-stage design-probe method (right) with visually constructed probes (left)

The framework was presented to the practising architects in the form of three separate visual probes (value diagram, temporal diagram and visibility diagram) that also gave examples to the architects of the material possessions associated with each characteristic. A fourth diagram articulated the room- and house- level storage strategies, and linked them back to the three main characteristics. Figure 2 brings together an abstraction of the four diagrams used as visual probes, to show how the overall framework presents a new characterisation and categorisation

of material possessions for design. For more detail on the framework, the reader is directed to Marco, Williams and Oliveira (2020).

Initially, twenty-five professional architects were contacted to be potential participants in the study. However, they were interviewed sequentially and the decision was taken to stopped the study after seventeen interviews, since responses had reached saturation and no further information was being collected (Creswell, 2007). In the first stage of the design probe method, the participants were asked to give *key details* to capture information about their experience and role within practice. The results (see Table 1) show that the participants include architects who work in small, medium and large architectural practices, and who work with an array of major house-builders. The participants held a range of positions, from Senior Partner and Director (41%) to Project Architect (41%) and Associate Architect (18%). The range of positions was considered important, as it ensures a diverse set of perspectives and approaches to housing design. The pool of participants was chosen solely for their experience of working with house-builders.

Once the key information was gathered, the *current practice* stage asked participants five follow-up questions on how they currently approach the design of standardised house types and how, if at all, storage considerations feature in any way.

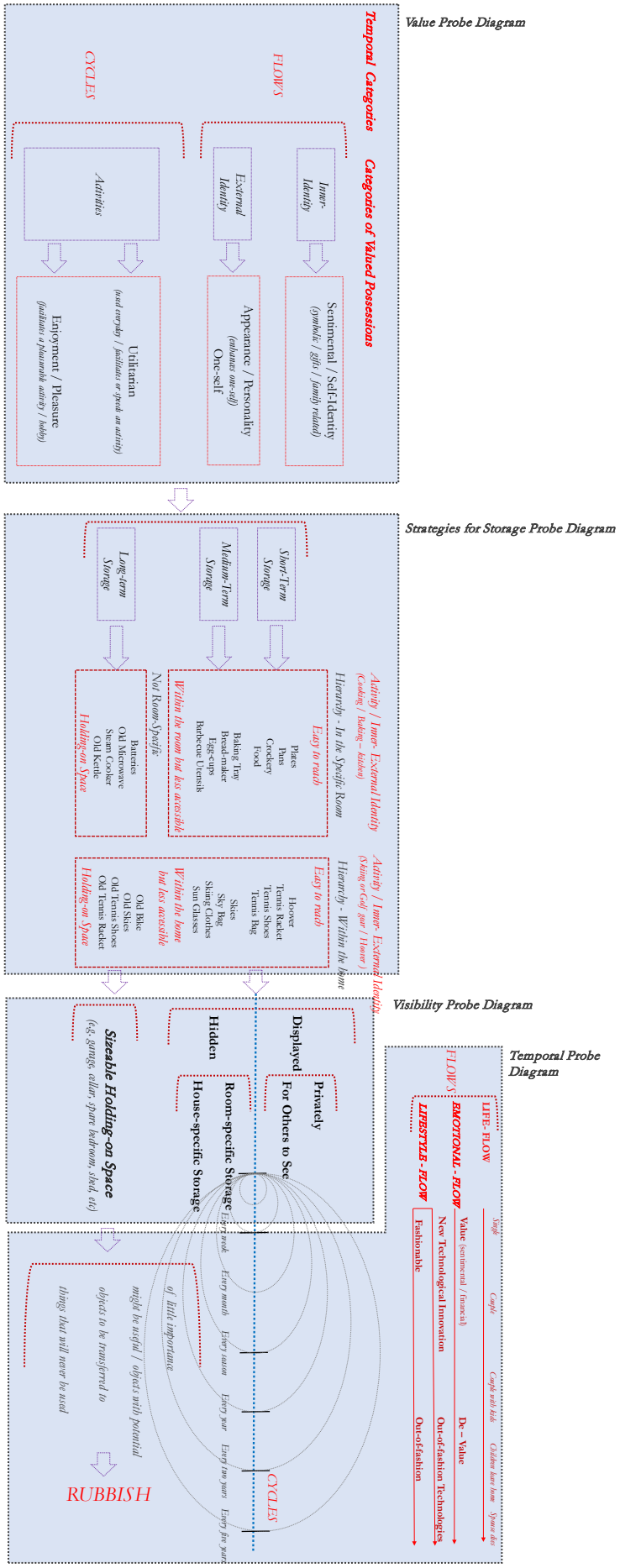

Figure 2: Overall conceptual framework diagram showing the four visual probes

Table 1: Key details of participants including role and experience

	Size of Company	*No of years working with house-builders / developers' schemes*	*Position held*	*Company Location*
Participant 1	*11*	*11*	*Project Architect*	*Bristol*
Participant 2	*24*	*8*	*Associate Architect*	*Bristol*
Participant 3	*250*	*8*	*Senior Urban Designer*	*Bristol / London*
Participant 4	*5*	*5*	*Project Architect*	*Bristol*
Participant 5	*100*	*3*	*Project Architect*	*Bristol / London /Plymouth*
Participant 6	*7*	*5*	*Director*	*Bristol*
Participant 7	*7*	*5*	*Director*	*Bristol*
Participant 8	*100*	*10*	*Director*	*Liverpool / Bristol*
Participant 9	*350*	*15*	*Divisional Director*	*Bristol / London /Manchester*
Participant 10	*350*	*2*	*Associate Architect*	*Bristol / London /Manchester*
Participant 11	*200*	*38*	*Senior Partner*	*London / Bath / Manchester*
Participant 12	*60*	*5*	*Project Architect*	*Hereford*
Participant 13	*60*	*5*	*Project Architect*	*Hereford*
Participant 14	*50*	*25*	*Urban Design Director*	*Bath / Bristol*
Participant 15	*50*	*6*	*Associate Architect*	*Bath / Bristol*
Participant 16	*30*	*10*	*Director*	*Bath*
Participant 17	*30*	*5*	*Associate Architect*	*Bath*

The authors then began the *briefing stage*, in which they introduced the participants to the carefully designed visual probes that summarise the storage-focused conceptual framework (Marco, Williams and Oliveira, 2020).

The probes focused the architect's mind on the impact of material possessions in the physical space of the house and their associated storage practices.

The *design dialogue with probes* stage then explored the participant's initial thoughts on how the framework could facilitate architects' approach to designing for storage. This was followed by the *design intervention* stage where participants were asked to sketch a design proposal for a 3-

bedroom house, chosen because it is one the most typical standardised house types currently being built in the UK (Hooper and Nicol, 2000). A layout from an anonymised typical 3-bedroom house was given for reference. This approach allowed the study to examine whether novel storage-design solutions and themes can emerge from the framework.

The final *debrief* stage asked the participants to make any further comments in relation to the study now that they had used the probes as inspiration. They were also asked to suggest any improvements to the probes, so the original framework could itself be refined as part this research.

Each study lasted about an hour in total, with around 5 mins for the key details, 20 mins for current practice and briefing stages, 30 mins for the design dialogue with probes and design intervention and 5 mins for the debrief. Everything was audio recorded, transcribed and then a thematic coding carried out. The thematic coding also took into consideration the authors' reflective notes of all interviews, as well as the sketches of the design proposals developed by the participants. The thematic coding firstly focused on participants' references to storage space, inhabitants and their experiences, flexibility, lifestyles and valuable spaces. These broad categories form the basis of the analysis presented in this study.

Analysis of Current Practice

None of the participants considered storage to any great extent when designing, and the inhabitant's material possessions were hardly ever considered during the design process. In contrast, all of the participants consider the cycles of activities that take place in the home. Fifteen out of the seventeen participants work with house builders that (re)use standardised house-packs, which have pre-specified layouts associated to costs, leaving little flexibility for change. All participants agreed that designing for storage would either increase the size of the house, or would reduce the number of bedrooms and bathrooms, and would therefore affect the house-pack specifications and overall cost. All participants agreed that the number of rooms is more valued than space for storage, irrespective of the size. Ten participants commented that

there is a need for innovation on the current standardised house-packs, but not necessarily by making them less compact.

Analysis of Design Dialogue with Probes

Three main notions, that had a bearing on how effective the probes were for the architects, emerged from the thematic analysis of the design dialogue transcripts. Participants referred to their own personal experience as inhabitants, they reflected on what had been lost in the physical space of the house, and they acknowledged the inhabitants as real people.

Personal experience

Whilst the participants received the probes well, the most powerful outcome was that the participants themselves stopped being the 'professional architect' and put themselves in the mind-set of the inhabitants.

Fifteen out of the seventeen participants reacted personally to the framework, and one of the participants went so far as to express feelings of sadness, as the framework reminded him of our finite lives. The framework took the participants on a personal journey of reflection on the nature of their own material possessions and where they are stored.

> *'I think, forgetting I'm a designer, this is me all over because it gets to a point where I have storage boxes which I keep under the bed and every now and then, generally, I'm putting sentimental things into them, I'll go through them and if I get something out and I think it maybe have been sentimental to me five years ago, but if it's not anymore, I'm ready to let go of it, so it's really interesting seeing that because I've never analysed what I do, but I do exactly that.'*
>
> *Participant 3*

Reflections on their own lives and lifestyles made them realise that if there is space it will be filled. Six of the participants, reflecting on their own homes, thought that house builders' approach to constrain the volume was the right one. All the participants asserted that proposing larger standardised house types was not the way forward, but house buyers need a better understanding of the space they are acquiring. Four of the participants advocated for different

housing models, where there are choices that are more aligned with today's living activities, suggesting that some of the house builders 'packs' were outdated.

> *'I think maybe it comes to choice then. Personally, I think, usability, people would prefer an en-suite bathroom, from sheer naivety, until you move in and you realise you can't put your stuff everywhere, …'*
>
> *Participant 5*

Reminder of what has been lost

Whilst bigger houses were not seen as the way forward, half of the participants felt that storage has been lost in todays' standardised house types, especially long-term storage. Two of the participants argued that these residual, useful, but lost spaces will be very difficult to get back.

> *'I think people don't have, in new houses, that sort of space which is tucked out of the way that they don't often need to go into, but it's still useful to have. I'm thinking like the attic, so old houses always had a loft space, but the way they build them today with the truss rafters, it means you can't really use them and they're often specifically designed not to be used, so people don't have that kind of space for putting their kids' box of old toys or something that they don't want to get rid of.'*
>
> *Participant 10*

These tightly packed aspirational rooms have an effect on the flexibility of space and the loss of storage space. Even if, these rooms do not help store the inhabitant's material possessions, they are presented as desirable 'must have' rooms.

> *'They will put in a downstairs shower room, they will put in a boot room, they will put in a snug, so these are all extra rooms that they can put a name to that adds value, it's not that they're putting a name to extra storage, although a mud room and a utility room would be storage …'*
>
> *Participant 15*

Standardised house types are designed for marketability purposes, where these tightly packed extra rooms are more valued than space itself. Nevertheless, five of the participants questioned whether some of these rooms are actually necessary for today's living, or are simply aspirational.

'…is not too dissimilar from the house I lived in – it was nice as a couple because it's quite luxurious, we had three toilets and two showers, but that's a luxury. I think the space could have been better used for something else because as a couple, you don't need three toilets, there's only two of you, but going on to when these are designed and the marketability of them, that show home living, I think it's like an aspirational thing…'

Participant 3

Real inhabitants

The probes also provoked a discussion around the unknown inhabitant. While the participants might think that they know how someone is going to use the house, the reality will be something entirely different. Even if you are dealing with the 'anonymous' inhabitant, all the participants felt that providing a physical space with sufficient capacity, adaptability and flexibility would enable the inhabitants to find ways to live in them. However, as seen in the previous section, flexibility is the major loss identified by the participants when considering standardised house types.

Five of the participants mourned the loss of widely used methods such as the Code of Sustainable Homes for assessing the sustainable design and construction of new homes, and tools like the Building for Life that assess the design quality of homes and neighbourhoods. The Code of Sustainable Homes was wound down in 2014 in response to the Housing Standards Review carried out by the UK Government and the Building for Life tool is less often used nowadays as the importance of the speed of delivery of housing has overtaken the desire to provide better places and spaces. These guidelines would have ensured that the quality of the houses was improved, embedded flexibility and better considered the inhabitant's lives.

'…we miss the standards, so I miss Code for Sustainable Homes and I miss having to do Building for Life assessments because they were rules that were just helpful. They would always try and get out of them, but they were really helpful in terms of raising the quality of the houses because I don't think they'll do it on their own…'

Participant 15

Five participants felt that house types should propose profiles of possible inhabitants that could live in a particular typology. Certain house builders' types would work for certain family units. For example, two of the participants felt that a three bedroom house type would work well for a couple, but it might not work so well if it housed a five person family unit.

> *'…a three bed house – so I used to live in a three bed house, a house builder house type – and it worked really well, for me and ……. as a couple. The people that bought it off of us had a new-born baby and a toddler. It's part of the reason we moved because I couldn't see how you would live in that space [with a child]…'*
>
> *Participant 3*

Analysis of Design Intervention

When presented with the challenge of using the conceptual storage design framework and the 3-bedroom house reference probes in a design intervention, all participants started to resolve the entrance space for meeting and greeting people first, and then spent the majority of their time trying to resolve what they called the downstairs 'living spaces'. In addition, all of the participants considered the outside spaces at the front and back of the house, before even considering how many bedrooms. Only three participants considered options for different occupancies (2 / 3/ 4 / 5 / 6 inhabitants) or the idea of 'a day in the life of'. The rest of the participants designed the house based on the number of bedrooms not inhabitants (or reduced the number of bedrooms in some cases). One of the participants went so far as to refuse to engage in the reconfiguration of the given typology, as the size was not acceptable for living and they do not work with house builders that build this type of house.

When the participants engaged in the creation of new design proposals that took into consideration the storage-focused design framework probes, three further themes emerged: the need for storage to be more valued, for inhabitants to distinguish between aspirational living

versus practical living, and the importance of building flexibility within the space. These themes are expanded below.

Storage as a valuable space

The participants reported that storage is not valued when designing standardised house types. It is seen as the residual space that has been left over. In contrast, this leftover space becomes a key design consideration when designing bespoke houses.

Storage was seen as not adding value to how houses are marketed in the UK, and in order for it to be valued, it would need to be part of the house builders' financial model, which was seen as unrealistic. When developing their own designs, participants were more interested in getting the 'critical dimensions for living', before any consideration of storage. For example, one participant kept measuring his design proposal to ensure the double bedroom had the critical dimension of 2250mm to ensure a double bed could be fitted tightly in the standardised spaced. All of them agreed that either you lose one of the bedrooms or the house size needs to increase, as space for storage could not be accommodated otherwise.

When exploring the typical 3-bedroom house, twelve of the participants incorporated a 'wall of storage' as a strategic design approach, so it becomes a defined and valued space. They considered the hierarchy of how to store material possessions depending on the short-, medium and long-term cycles, and thought about a strategy for storage at room-level and house-level. Eight of these participants even extended the 'wall of storage' to the external spaces at the front and back of the house. The 'wall of storage' became both a house and a room-specific type of storage (see Figure 3).

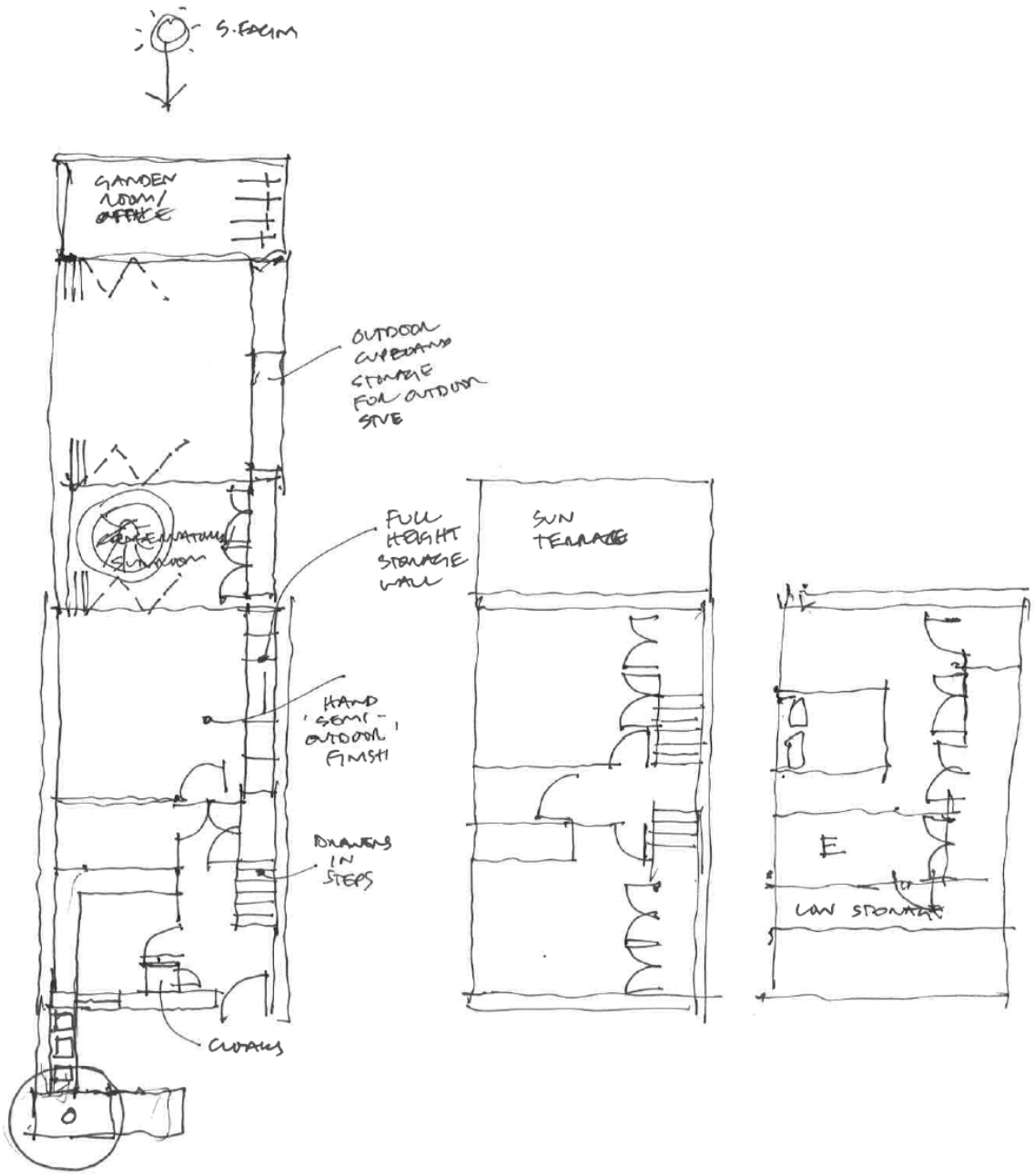

Figure 3: Wall of storage design strategy (Participant 10)

A 'central house storage' space was considered alongside the 'wall of storage' by five participants (see Figure 4). It was placed around either the staircase or the utility / bathroom areas. This option required a wider house footprint and considered double access storage.

> *'I'm thinking, it would be quite easy just to create a wall of storage behind the stairs, but that then starts becoming hidden storage, like on the ground floor, do you really need hidden storage on the ground floor, because the ground floor is normally your living spaces if you're thinking around the idea of*

displayed and hidden, and for you and for others, then your hidden needs to be mostly on the upper floors…'

Participant 10

'…but I suppose, as a design strategy, what they don't necessarily do is have storage walls – but they can be quite space hungry – but having a strategy, so that you can store things and for the storage to be concealed.'

Participant 1

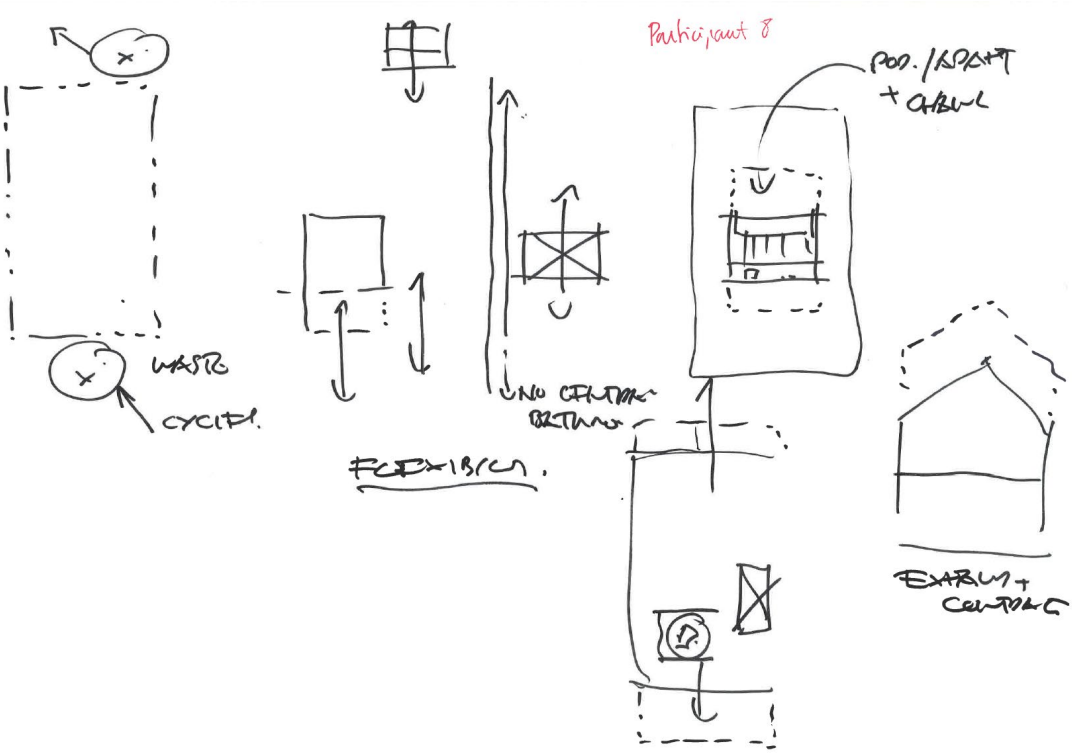

Figure 4: Central house storage design strategy (Participant 8)

Both the 'wall of storage' and 'central storage' design strategies became a defined space within the house, which could be specified and layered in a similar way to kitchens or bathrooms. Four of the participants, explored how these 'walls of storage' could be standardised in an IKEA way.

'I think inbuilt storage that is modular, standardised and I don't know if IKEA have the monopoly on how big a box is, but it seems... I think it's that party wall condition because it's good for sound and … you could maybe split that into archive along the wall and then every day.'

Participant 2

Finally, five of the participants explored the 'loft space' as a valuable room for long-term storage of material possessions (see Figures 5 & 6). The loft then becomes a space included as part of the house, that needs to be carefully designed, as an architect would do with a kitchen or a bathroom.

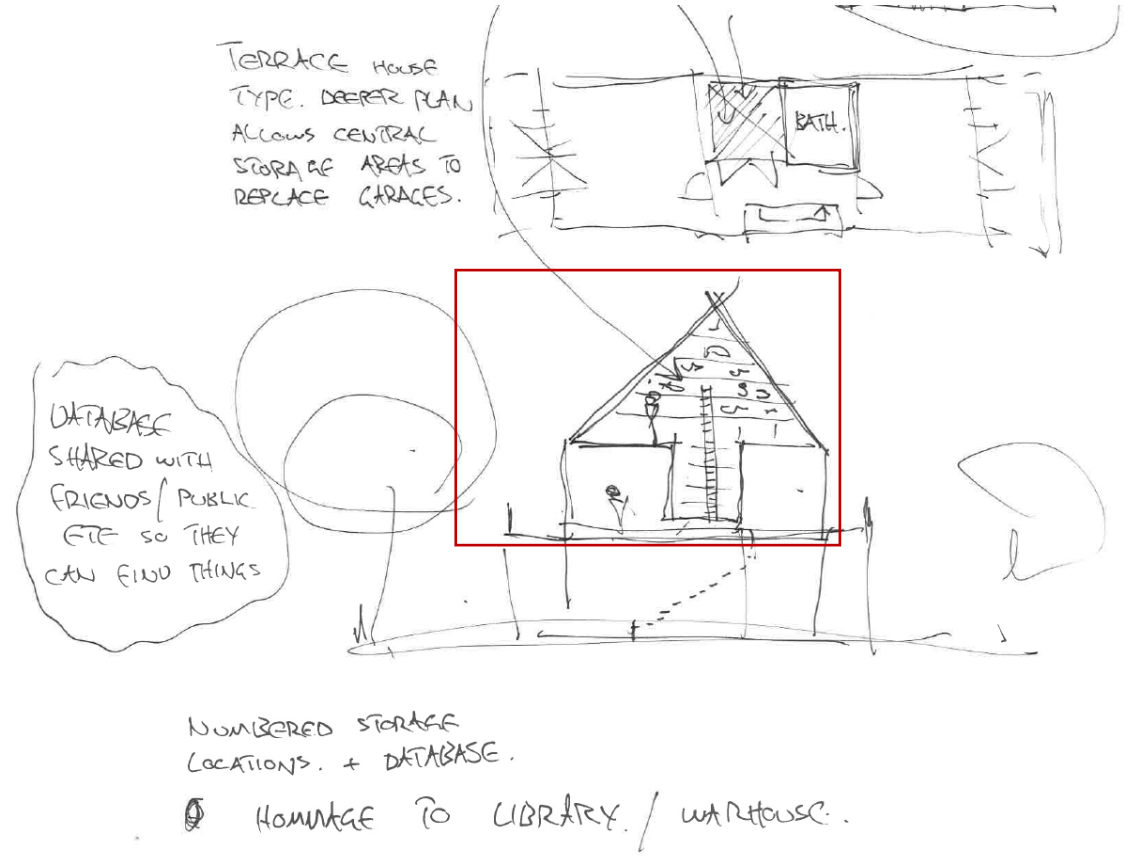

Figure 5: Loft space as a valuable space (Participant 9)

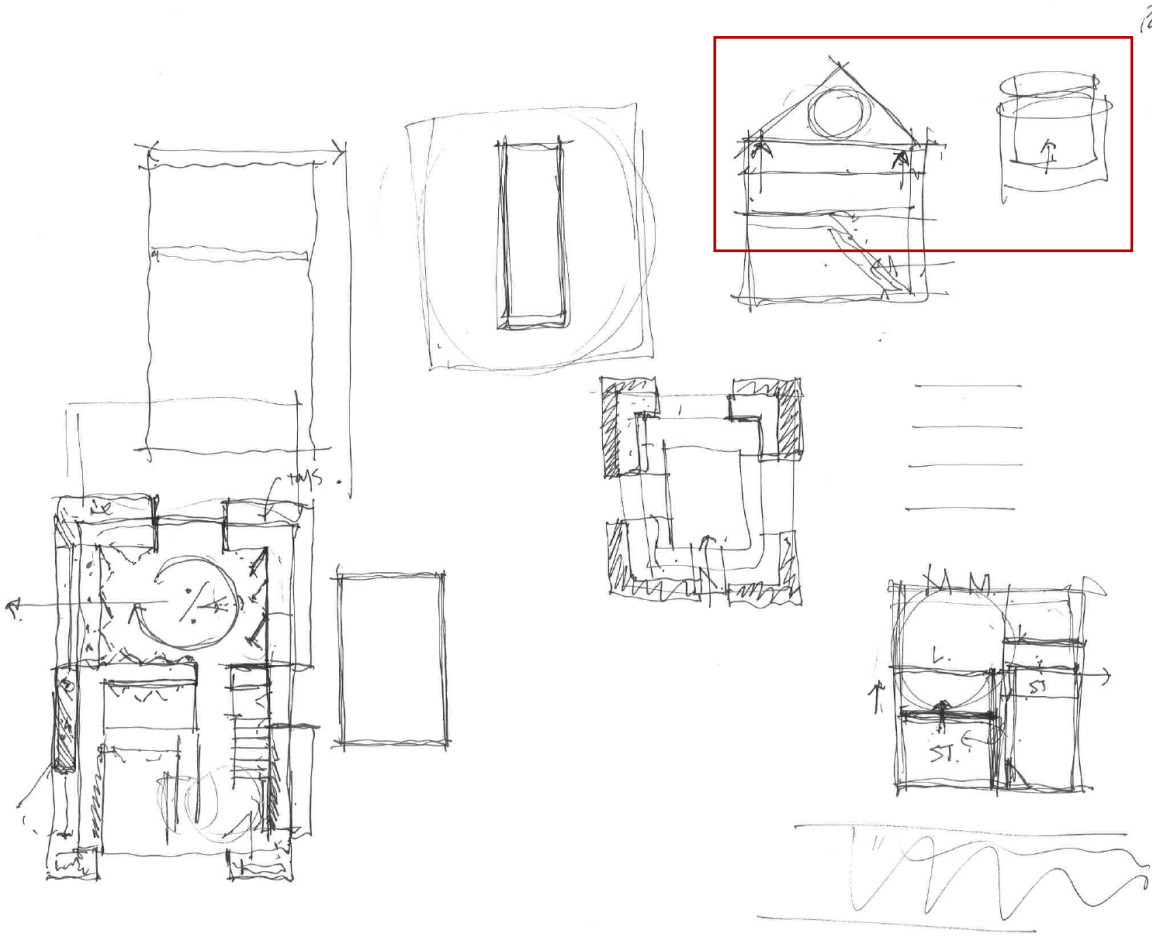

Figure 6: Loft space as a valuable space (Participant 5)

Aspirational versus Practical Living

House builders' houses are showcased to portray aspirational lifestyles that do not take into consideration the inhabitants' real lives and their possessions. Four of the participants advocated for 'practical' living instead of 'showroom' living. Storage needs to be considered from the perspective of efficient tendencies and design-out 'likes and wants'.

> *'... it's not very glamorous, when you're buying a house, when the specification's listed out, it should be, I don't know how you make storage more glamorous to people to make them realise 'you actually need this.'*
>
> *Participant 5*

Twelve of the participants proposed design strategies for living, where the relationships between rooms becomes very important and reflected modern (contemporary) living. Seven of the participants felt that the entrance space was key, to leave the outside life behind and to be able to meet and greet people. They paid special consideration to where to store coats, boots, etc.

> *'I suppose the thing that's missing on this and reflecting on this, where I've been focusing on using this house type is for something like this, it would be good to have... like where do you dry your clothes? There's still not that practical... there just isn't the space, whereas if you were to have that extra metre – perhaps it's more than that, actually…'*
>
> *Participant 3*

All participants were particularly interested in creating a 'sense of space' related to their personal understanding of what today's modern living meant for them. Two participants also felt that what is understood as modern living puts pressure on space for living, especially with extra rooms being cramped, taking away any sense of space, space for living and space for storage. Three of the participants questioned the need for so many bathrooms considering the time spent in them, or the need to have the extra 'box room' to store their possessions.

> *'I think differently. I'm on a bit of a quest to know what are the numbers of en-suites in the modern world. Cramming in en-suites is a bit ridiculous. …'*
>
> *Participant 10*

> *'... what I haven't done is created storage space, I've created a sense of space more because that means that that is all one space.'*
>
> *Participant 11*

Flexibility

Creating a 'sense of space' was linked with the desire to make the house flexible (see Figure 7), allowing inhabitants to explore different ways in which they could inhabit the space. It was seen as important to ensure that any design proposed could be adapted by the inhabitants. If a house can flex and adapt, it will have the necessary capacity to accommodate storage. Nine of the

participants, tried to reintroduce the flexibility that had been lost, back into their design proposals. Designing for 'anonymous' inhabitants (since the design is carried out without knowing who will be living in the house), would mean that they might be unable to satisfy their needs. Whereas, if flexibility was built-in, the inhabitants would find a way to make it work. So, proposing flexible and adaptable models within the same footprint that display different scenarios even with fewer rooms, was seen as important.

> *'…so I think my sense is that the important thing is there is space to be adaptable and flexible within the zone of the house and people will find ways to use them.'*
>
> *Participant 6*

> *'…has to be something more of a system, your house could get bigger, it could contract, depending on who takes it on board, so I think it's all about... for me, it would link to the idea of flexible space and adaptable space within the same footprint…'*
>
> *Participant 8*

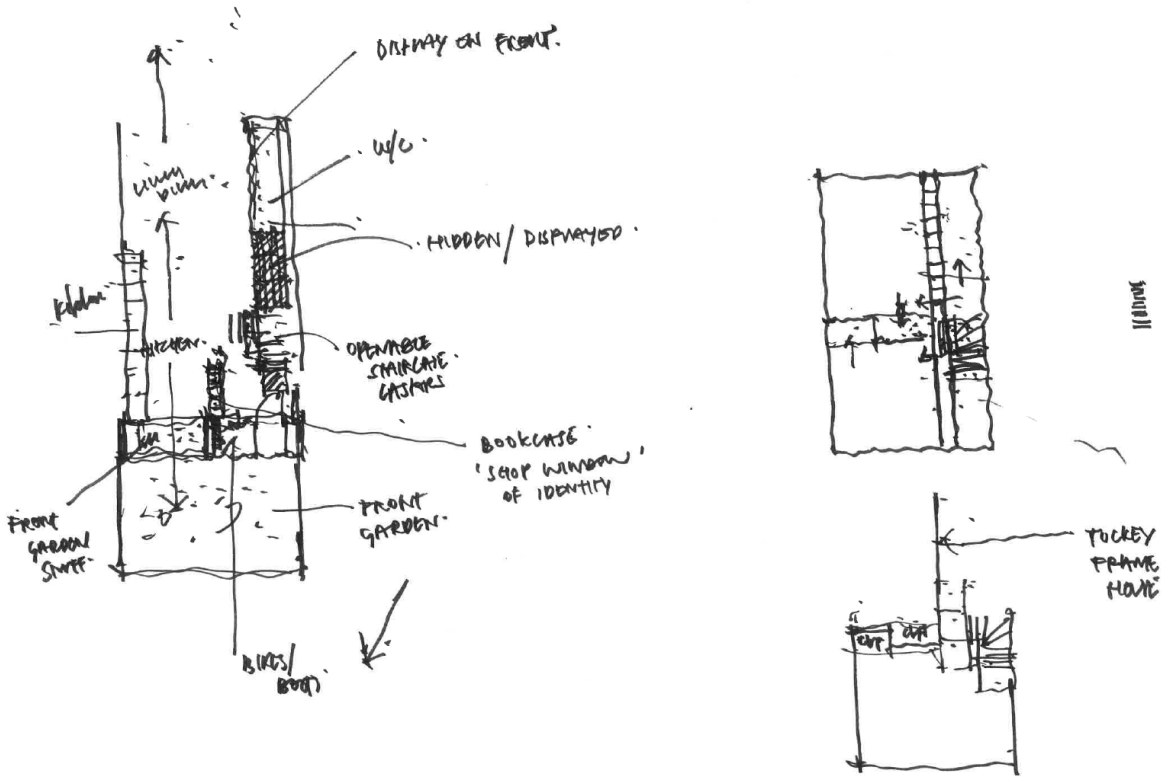

Figure 7: Designing for flexibility (Participant 12)

Analysis of Debrief

All the participants found the conceptual storage design framework probes effective as a prompt to remind them that real people with real material possessions will be living in standardised house types. All but one of the seventeen participants recognised that the framework unpicked an area of housing design that they had not considered in the level of detail that the framework presents.

> *'…I find just the itemisation of it useful, in that it reminds you of all the different elements that there are to be considered ……, it's quite a useful check list, to ensure that you are accommodating what you need to. There's things on here that are so small, you can forget about them really, but on the other hand, there are actually some of these things are quite significant and you don't want to hone spaces down so much or new homes down so much…'*
>
> *Participant 7*

However, Participant 6 found the detail too much. They articulated that designing the interior space of the house is less important than the space created outside the front door. This space, neither public or private, becomes more vital in shaping better places, which goes a long way towards defining the quality of people's lives and affects their well-being.

The participants were also asked to reflect on how the conceptual storage design framework probe could be improved. Participant 3 suggested that the house as a physical space is a unidirectional flow in itself since, depends on the inhabitants and the specific moment in their lives. Therefore, they suggested that a '*life-house'* flow should be incorporated into the framework probe.

In addition, Participant 6 proposed the need to consider a *'life-stuff flow'* to reflect all the extra material possessions that the inhabitants or family unit will accumulate in their lifetime, even after completing cycles of ordering, sorting and disposing. Nowadays, architects are increasingly designing houses for an older age group, and therefore Participant 6 felt that it was important

to consider those at the end of a life-flow, as they have accumulated a large number of material possessions during their lives.

> *'…they just wanted storage, they had a lifetime's worth of stuff, they'd got a house full of stuff, downsizing, getting rid of the house and trying to find space for their possessions is quite an important part of that and I think it's something that was not on offer…'*
>
> *Participant 6*

On reflection, the emotional flows within the proposed conceptual storage design framework probe already include the valued material possessions that have been collected during the inhabitants' lives, as they hold sentimental, emotional or financial value. However, the volume of these possessions needs to be more explicitly understood.

The participants agreed that the framework would be of use, even when designing for house builders. Eight participants thought that the framework would be even more useful with private clients, where houses are designed for the specific needs of the particular inhabitants. Two other participants thought the framework would be useful for participatory design, as a way to help inhabitants understand how they really live. They felt that this deeper understanding on the part of the inhabitants would lead to much more refined designs for storage.

> *'… because you could imagine using this system for participatory design, so if you were working with residents or co-houses or people like that, you imagine developing this as a tool to enable them to understand their waste and collections and help them to design their storage. I think it would be a really powerful tool for that, in many ways, more than it would be for developers.'*
>
> *Participant 8*

However, three participants identified time, resources and the nature of the client as key drivers to the design and delivery of standardised houses. Nowadays, the drive to deliver more houses and maintain profits is 'blinkering' the design quality of the houses that are currently being built. Twelve of the participants felt that innovation and change does not fit within a delivery agenda, and storage even less so, as it is not valued.

'…so you could see something like 'I wonder how much they would value this when the big boys are so blinkered and dominated by standardisation, delivery, delivery, delivery and profits?' But if we're not careful, what we're delivering won't be fit for purpose, it will always have to come from policy or a standard for it to be pushed forward.'

Participant 14

Discussion

Storage is not valued by house builders, architects, or even inhabitants when building, designing or buying a house. However, it is a vital and invisible dimension of the inhabitants' inter-personal relationships and lifestyles. It facilitates order, both physically and mentally, and affects their well-being (Cwerner and Metcalfe, 2003; Smith and Ekerdt, 2011). This study has argued that a consideration of storage and its associated practices is vital for housing design. By considering the appropriate characteristics of space and possessions, the inhabitants' lives and lifestyles will be better supported, which will have a positive effect on their well-being (Marco, Williams and Oliveira, 2020). In order for new models of housing to emerge, that consider inhabitants' material possessions, space for storage needs to be more valued than 'showroom living', and not seen simply as residual or leftover space. For this to happen, storage spaces need to be seen as inspirational and experiential (Rodrigues and Brandão, 2020) and, in the words of Participant 5, "made more glamourous".

In current housing design, space for storage has been eroded to accommodate the ever-increasing number of rooms. Rooms currently add value to a house, whilst space for living and storing does not. Currently, developers reduce the size of the houses, add more 'must have' rooms to ensure drivers like profit margins, developments costs and housing demand are addressed (Williams, 2009; Mayor of London, 2010), and dispute the need for more space and for regulated space standards (Madeddu, Gallent, and Mace, 2015). The UK has never had mandatory space standards for private housing, and since the removal of the Parker Morris standards in the 1980s, neither has it had them for public housing (Park, 2017). The National Described Space Standards introduced in 2015 (DCLG, 2015) are optional, and local authorities

can choose to adopt them if there is a local need and the viability of housing is not compromised. So, whilst the authors agree with most of the participants that standardised housing types need to continue to treat space as a premium to facilitate more house building, they feel strongly that this should be against a background of minimum space standards, so that the houses are still fit for purpose and do not compromise the inhabitants' lifestyles or wellbeing.

When the study participants were asked to design for storage, their approach was to do so in a way that created a valued 'room' in the form of a 'wall of storage' or a 'central house storage'. Some participants also tried to bring back traditional residual spaces like the 'loft'. This meant that the storage became a valued dedicated space in itself, one that could be costed-in by the developers. Whilst these 'must have' rooms sell well and continue to drive the developers house portfolios, very little innovation in housing will be seen. Therefore, the authors argue that these static developers' portfolios need to be challenged, to bring about new and appropriate housing models, driven by flexibility and adaptability as well as inhabitant's profiles. This is reinforced in the literature, where it is noted that house builders do not often create new designs, but make incremental modifications to their existing portfolio types, which lacks design innovation (Hopper and Nicol, 2000). The need to fundamentally challenge these developers' portfolios is also questioned by Imrie (2006), who argues for alternative developers' models for vulnerable groups such as disabled people, as the current models are 'perpetuated forms of spatial injustice'.

This challenge is unlikely to happen unless the market forces change also. Inhabitants need to understand the space they are buying and how it might work for their specific family unit's lifestyle at that specific point in their life. Furthermore, some participants desired a return to the historic mandatory design guides, which had minimum space requirements in excess of current provision. This would provide space for greater flexibility in their designs, and would allow them to include storage provision.

The design proposals that emerged from the study reinforced previous studies, where flexibility was identified as critical (Schneider and Till, 2007; Wigglesworth, 2019), but brought new

perspectives on the standardised house types. These design responses also built on the work of Bentley (1999) by placing the inhabitants, and their well-being at the heart of any design decision and propose a 'layered approach to storage' as a crucial typological development. Participants advocated for flexibility and adaptability within the current compact sizes. They favoured largely maintaining current sizes, especially for standardised house types, as they need to be affordable. This is especially important, given that the UK is currently in the midst of a national housing crisis, in terms of the number of units available, their speed of delivery and their viability (Wilson and Barton, 2018). However, they challenged the need for so many 'must have' rooms that add value to the property, but not to the inhabitants if their space for living becomes compromised. Furthermore, by using the storage-focused conceptual design framework, the participants reflected on the inhabitants' material possessions related to the activities, the inner- or external-self of the eventual inhabitants, and created spaces that could be used appropriately by them. This is an approach they had never taken before and was a valuable and enlightening experience for some.

Conclusion

For the first time, this study has brought storage practices to the centre of standardised housing design, to stimulate new housing design approaches focused on storage for material possessions related to activities, inner- or external- self, either at room- or house- level.

The strength of the study lies in bringing together two widely acknowledged problems, the housing problem and the growing preoccupation with the acquisition of material possessions. The study also has brought a new unexplored dimension to design practice research and housing policy debates, that of going beyond providing space for living and taking the impact that material possessions have in the physical space of the home, supporting the resident's lives and lifestyles and therefore their well-being. It has engaged a small number of practising architects in an exploration of design, using a dynamic and reflective research method that challenges architects to approach a design problem from a new perspective, that of storage.

It demonstrated that practising architects found the storage-focused conceptual framework (Marco, Williams and Oliveira, 2020) an effective prompt to remind them that real people with real material possessions will be living in standardised houses. It produced new empirical knowledge of how storage can be included in housing design, avoiding cluttering spaces and therefore impacting positively on the quality of life and well-being of the inhabitants. The majority of participants who tested the effectiveness of the framework recognised that it unpicked an area of housing design that they had not considered in such a level of detail before.

The conclusions of the study challenge the current static developers' housing portfolios, and identifies a need for new and appropriate housing models for all. These new models can address the health implications associated with the accumulation of material possessions and insufficient space to store them, by proposing a 'layered approach to storage' as a crucial typological development. These new models cannot ignore the viability and affordability of housing, especially when considering the smallest units, the standardised house types, but neither can they ignore the needs of those who will live there.

While the focus of the study has been on UK housing, its method could be applied more widely to any context where design practitioners are engaged in developing new and original knowledge towards the practical implementation of original design solutions.

More research is required on how this storage-focused design framework and new architectural knowledge can be used to develop practical guidance for storage design that would be of used to architects, residents, house builders and policy makers. This is the focus of the authors' ongoing work.

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