# RESIDENTIAL DESIGN IMPLEMENTING SOCIAL SUSTAINABILITY: Towards a Paradigm Shift within Design Thinking?

Anna Braide Eriksson[1]

[1]School of Architecture, Division of Building Design, Chalmers University of Technology, 412 96 Gothenburg, Sweden, Email; anna.braide.eriksson@chalmers.se

**PAPER ABSTRACT** The ongoing demographic transformation challenges existing residential design. Meanwhile rules and regulations conserve a conventional approach on the subject. The housing market is considering the residence as a commercialized lifestyle question, not focusing on long-term residential resilience. These preconditions imply a misfit between accelerating diversity in articulated consumer preferences and appropriate offers on the housing market. This situation challenges residential life quality, in particular regarding issues of social sustainability.

In order to obtain a sustainable housing stock we have to develop a new focus and new perspectives for the design-professions. The study constitutes a part of a larger research project, The Positive Footprint Housing project, wherein the licentiate thesis concentrates on the notion of residential flexibility and how it relates to aspects of social sustainability. It also focuses on how social sustainability issues can be activated into the practice of residential floor plan design.

The methodological approach is based on a mixed method research where studies of residential life and research by design are employed. The work embrace a theoretical perspective based on assumptions from Schneider and Till[1], and tests the hypothesis of residential flexibility as a critical precondition for a socially sustainable residential process. Findings from the research show that flexibility in residential design represents an important factor in the realisation of a sustainable society. The work results in the elaboration of a model for implementing social sustainability aspects into the design work to promote a future sustainable housing design. The continuing research intends to address the complexity of residential user participation and accompanying social consequences. This paper concentrates on the latter part of the licentiate thesis. It presents the process and results from the research by design work in the master studio environment.

**Keywords:** Residential flexibility, Flexible Housing, Social sustainability, Residential design

**AUTHOR BIOGRAPHY** After I finished architectural exams 1996 on Chalmers University of Technology, I have been working as a practising architect during approximately 13 years. One focus from this work has been housing. The experience of this work with the existing framework and limits for the housing development, from the architect's perspective, has initiated questions raised in my Licentiate thesis work. During 2008 and 2009 I also performed two studies of residential practice together with Ola Nylander, Professor at Chalmers University of Technology. Results from these studies showed how residential space were adapted and used in different living situations and life sequences. I consider my research work as an opportunity to make visible and develop some of the experienced questions from these studies. Since 2011 I work as an Artistic Senior Lecturer at Chalmers University of Technology, teaching housing planning on Bachelor and Master level. Since 2012 I am also a PhD candidate here.

[1] Schneider, T. and Till, J. 2007. *Flexible Housing*, Oxford: Architectural Press, Elsevier

# 1 Introduction

This paper presents one phase of my ongoing licentiate thesis work. The research preconceives a Swedish context and departs from the ongoing demographic transformation, the situation on the housing market and the current standards for housing design. These present preconditions are regarded as challenging residential life quality and aspects of social sustainability from a short-term and long-term perspective. The thesis relates to a situation of an ongoing urbanization. It is concentrated on units in multi-family housing and accompanying traditional residential patterns.

A starting point for the thesis work has been the participation in the research project *Positive Footprint Housing* (PFH Project). The project is a collaborative project between the academy and the industry, with Riksbyggen, a large cooperative housing developer, as the main stakeholder. The PFH Project is aimed to generate usable knowledge of sustainable residences and housing constructions at the international front edge, building a knowledge project between the academy and the industry. This paper will not present the part of the thesis work involved with the PFH Project.

## 1.1 Demography, Residential Design and the Housing Market

The demographic transformation now taking place worldwide implies changing household structures (Dyson 2012, 3). The transformation constitutes a substantial precondition for the design of residential space as it reflects the structure of households (Schneider and Till 2007, 37). In Sweden the demographic transformation means a trend towards a larger group of small households. The nuclear family that has been seen as the standard household has undertaken changed formations and cohabitation are becoming more common (SCB 2009). In Europe there has been a shift from uniform to pluralistic households and growing importance of childless living arrangements, if this also applies to a Swedish context is not clear but these trends can be considered more or less associated (Haase, Kabisch and Grossmann 2011, 53-54).

In Sweden the design of residencies has been oriented towards the nuclear family since the housing planning after the Second World War until the 1980's (Lindén 1995, 1-2). This orientation is still present in the current housing standards and affects residential design today. The discrepancies between the household's size and composition, and the increased cultural diversity on one hand, and the unchanged principles for the housing design on the other, implies a mismatch between households and residencies.

Residential design is also affected and defined by the Swedish housing market. The market is ruled by the belief that *ways of residing* (Gromark et al 2014, Paadam et al 2015 forthc.) are a commercialized life-style-question and sells a commodified lifestyle (Schneider and Till 2007, 37). This means that long-term considerations of future adaptability is completely lost. The typical new produced apartment is, according to Manum, well suited for primarily young couples, singles and older couples, leaving their villas (2006, 183). Manum describes a Norwegian context, but in Sweden new apartments are also oriented towards a smaller group of specific household types. This situation means that the housing market owns a fundamental part of decisions affecting residential design wherein a large part of households are not represented. This in turn implies that households that do not have the possibility to buy their residence are directed towards the remaining housing stock. As there is a housing shortage, these households can have difficulties finding an apartment providing a residential space fitting for their required needs. This in turn can also mean that social aspects of residing such as safety, life quality, belonging and identity can be questioned.

Summarizing, this situation challenges residential life quality, in particular regarding issues of social sustainability. The objective for the thesis work is to emphasise the social sustainability dimension as a critical aspect for the design practice, and to introduce possible entries into the subject of residential design and social sustainability for stakeholders within the housing development field. The aim is therefore to develop knowledge of how residential design relates to social sustainability and to find a working model promoting social sustainability aspects within design practice. For the social sustainability perspective the thesis work relates to a framework presented by Kevin Murphy (2012). The thesis work preconceives residential flexibility as a critical precondition for a socially sustainable residential process and embraces a theoretical perspective based on assumptions from Schneider and Till (2007) and uses the term residential flexibility, referring to the notion of Flexible Housing.

## 2 Social Sustainability and Residential Flexibility

The thesis work relates to Murphy's framework for Social sustainability (2012), with organising dimensions, and correlates the social dimensions from his work with social aspects associated to residential flexibility and residential process described by Schneider and Till (2007, 46-50).

### 2.1 Four dimensions of social sustainability

Customary today is to characterize sustainable development in a typology with three pillars representing the environmental, economic and social dimensions. Murphy is critical towards the three-pillar disposal. He promotes a more holistic perspective on sustainability and constructs a frame for interpillar linkages between the social and the environmental pillar, the Social-Environmental framework. The four dimensions *equity, awareness of sustainability, participation* and *social cohesion* constitute organising dimensions in his framework (2012, 1). Schneider and Till regards residential flexibility as a factor that can enable social sustainability, by responding to demographic changes and to residents changed needs (2007, 35-50). The way I use Murphy's framework here is to consider it from the perspective of a residential context. The *awareness of sustainability* dimension and the linkage to the environmental field that Murphy brings up is projected in the thesis work, but not brought forward in this paper.

The *equity dimension* can be regarded as the equal rights for every resident to have a qualitative, well-functioning living space, adaptable to different life phases. In this context the residential flexibility can enable households with a small economy and low prospects for a new dwelling to rearrange a poorly working space. This can mean potentials for renting out a room or just arranging for a functioning everyday life. Schneider and Till regards residential flexibility as a factor that can enable social sustainability by responding to demographic changes and to residents changed needs. In this context residential flexibility can provide a larger range of usable space for diverse households than the nuclear-family-limited-focus can today. This makes the access to flexibility an *equity* factor. The long-term perspective that Schneider and Till introduce, stressing that residential flexibility, can counter the demographic changes as it provides changeability for the uncertainty of future demands, can also be regarded as an *equity* perspective when regarding coming generations, as this makes the housing stock a long-term usable asset for diverse households and future generations (2007, 35-50).

The *participation dimension* can be related to the user participation notion within the Flexible Housing field. From the perspective of user participation the flexible space is not only seen as a practical use of physical space but as a means of the resident to engage with the dwelling, attaining social aspects of belonging and identity, quality of life and self-realization. The notion describes the resident's possibility to be involved in the design of the own home. Habraken speaks about the idea of the dwelling as a 'possession of the occupant' and in a larger context he aims for the empowerment of the user (2011, 14-17). According to Schneider and Till the principles of flexible housing during the user participation era was seen as a democratisation as well as a decentralisation of the planning process (2007, 28).

When discussing the *social cohesion dimension* Murphy, among other things, refers to Dempsey et al. (2011) and their subject of the sustainability of the community (2012, 25). In their work five interrelated and measurable dimensions are defined: social interaction/social networks in the community, participation in collective groups and networks in the community, community stability, pride/sense of place, and safety and security. The five dimensions stressed by Dempsey et al. can be correlated to the residential process and the enabling of living in the same dwelling or neighbourhood during a longer time span. This perspective is also presented by Schneider and Till. In their view, the dwelling should be able to respond to the changed spatial needs during the living process for a household. To be able to stay in the same dwelling, and neighbourhood, and not being forced to move they see as a precondition for stable communities (2007, 35-50).

## 3 Framework and Methods for the Thesis Work

### 3.1 Residential Flexibility – a Definition

There are many different definitions of the term residential flexibility. Schneider and Till's approach to the notion Flexible Housing is used as a definition for residential flexibility: "At its core, therefore, Flexible Housing *(residential flexibility)* is housing that can respond to the volatility of dwelling. It does this by being adaptable or flexible or both." (2007, 5)

This definition is broad. It brings up volatility as a precondition for dwelling. Schneider and Till considers the dwelling's capacity to deal with changed needs in an ever on-going residential process as crucial to the residential design task. The definition also employs the two terms *adaptability* and *flexibility*. For these terms they refer to Steven Groak. Adaptability is by Groak defined as 'capable of different social uses' and flexibility as 'capable of different physical arrangements'. Adaptability can, according to Schneider and Till, be achieved through rooms or units that can be used in a variety of ways. Flexibility can be achieved by altering the physical fabric of the building. (2007, 5)

### 3.2 Research Question

*- How can the design of apartments contribute to improved social sustainability of residential conditions, and to the discourse on social sustainability?*

### 3.3 Methods

The research methodology has been designed to penetrate the issues forwarded in the thesis work, to develop knowledge of how residential design relates to social sustainability and to find a working model promoting the social sustainability aspects within the design practice with residential floor plans. The thesis work has been based on qualitative research with empirical studies. It has been performed as a mixed method research, organized in three phases. For phase one and two of the work, the method used has been studies of residential life. For phase three, research by design in master studios has been used. This paper handles the phase three of the thesis work.

#### *3.3.1 Phase one and two*

The first study, the phase one, constitutes two studies of residential practice (Nylander and Braide Eriksson 2009, 2011). The studies were aimed at understanding the use and qualities of residential space for different households. The empirical data consists of interviews with a number of households. The interview material and furnished floor plans of the home were used to describe and map the residential situations. Results from this study illuminated the different capacity of spatial usability in different dwellings and the spatial fit for diverse households.

The second study, the phase two, was based on the findings from phase one. This study was aimed at understanding how spatial usability and flexibility in the home was related to aspects of social sustainability. To reflect and relate to the demographic transformation, diverse household types were selected from the first study. Their living situations were analysed, presupposing the resident's subjective apprehension of the living situation as a starting point. The results showed that social sustainability aspects as social inclusion and interaction, safety, belonging and identity were critical for the households. These are aspects that are related to the possibility of staying in the same neighbourhood or the same dwelling during a longer time span. These aspects can be referred back to the *social cohesion dimension*. The misfit of some residential situations also appeared as a consequence of evolving needs for space occurring with a different new life phase. This made time an emerging factor in the thesis work.

#### *3.3.2 Phase Three*

The phase three of the thesis work was aimed to make social sustainability aspects salient within the design work. Here the findings from the two earlier phases of the thesis work were to be applied. Phase three was performed in master studio environment, with an applied research by design approach. The studios were run as separate master courses for three semesters. The students worked with housing projects situated in different geographical contexts. During the studio work the aimed solution was very much unclear, whether the focus should be on a factor, a method or a process or something else. The phase three is further presented below.

## 4 Space, Time and Sustainability Dimensions in the Design Work

The results from phase two of the research, revealing the neighbourhood as a critical quality for social sustainability dimensions, constituted a starting point for phase three. To stay in a neighbourhood during a longer time span, despite a changed living situation, appeared as critical. This situation has in the thesis work been related to the time aspect and to the residential process.

The residential process also appeared in the discussion on Murphy's dimensions and residential flexibility[2]. From the adopted perspective in this discussion, the dimensions of social sustainability appeared to be linked to the dwelling's capacity for providing a qualitative living space for diverse households, during different life spans. The *residential process* (implying different life phases), and the *residential flexibility* (meaning possibility to adapt the dwelling to existing needs), appeared as critical factors, sustaining the discussed social dimensions. The potential of correlation between these factors has been considered as critical to proceed with for the phase three of the research work. For this continuation the notion of residential process needed to be revised.

### 4.1 The Residential Process

In many works within the Flexible Housing field the time factor, implicating changed residential needs, is an important variable (Habraken 2011, 18-21; Priemus 1993, 19; Brand 1994, 2; Leupen 2006, 17-20; Schneider and Till 2007, 35). Schneider and Till relates to the residential process claiming that housing is subject to a whole range of cyclic and non-cyclic changes. If requirements are not fulfilled results may at worst be obsolescence. They also define what residential processes there are to be attained:

> Housing has to be flexible enough to deal with two conditions. The first is the need to adapt to the changing needs for individuals as they grow old or less physically able. The second is housing that can respond to the changing constitution of a family as it grows and then contracts. (2007, 41)

Brand stresses the questions of space and time as crucial intertwined factors in the design practice. He involves time as a major factor in the use of space and stresses the importance of the buildings adaptability countering time and the need for spatial use (1994, 2).

In the Dutch housing tradition the residential process and the Flexible Housing idea have had an apparent function through the years and the issue has been present in their practice of housing design. Already in the thirties, Dutch architects Van den Broek and Leppla conducted research on processes of residential use combined with the different life phases. A dwelling had to be able to meet all the functional needs of the individual users (Van Eldonk & Fassbinder 1990, 29-31). Later Habraken also brings up the subject, describing dwelling as a result of a process and claims this process to be central for the dwelling, 'If the dwelling has a function, it is that it exists to allow man to function.' (2011, 21). Priemus subdivide the process of dwelling into external and internal cyclic and non-cyclic changes (1993, 19). Defining the dwelling processes as a natural recurrent cycle. The issue of regarding the residential process as an essential part of residential design appears

[2] See p 3

to be present also in more recent design practices in the Netherlands. Van Eldonk and Fassbinder describes the increasing diversity of household types and the fluctuating of various forms of accommodation as influencing factors for the drive of flexible housing architecture developed in the first half of the 1990's (1990, 65).

In Sweden the residential process as a precondition for floor plan design does not appear as a commonly used focus. The flexible housing projects, the Experimental house in Järnbrott (1954) and the Orminge project in Stockholm (1964), are exceptions. In these two projects the user participation, enabling the own choice for adapting space during the residential process, is stressed as a central factor for the floor plan design.

### 4.2 Implementing Time Into the Design Work

During the studio work with research by design, the time factor was implemented to follow up Schneider and Tills discussion (2007, 50), the findings from the phase two study and the discussions of Murphy's social sustainability dimensions and the residential process[3]. The students were told to present the floor plans as a sequence of living situations.

## 5 Results From the Phase Three

The concluded relation between space and time, *spatial flexibility* and *residential process*, and the further exploration of these notions in residential floor plan design have resulted in a method for visualising the floor plans capacity for supporting diverse living situations. The method can provide both the short- and the long-term perspective on the dwelling's capacity to enable social sustainability dimensions. The method can also make the social sustainability dimensions salient in design practice, constituting a tool to implement social aspects when working with floor plan design.

During the studio work the method has been named the Space-Time Model. It consists of a number of floor plan models, projecting the same dwelling, visualizing different living situations. In the model one stipulated household's diverse residential situations, during different life phases, are presented. This is effectuated through narratives of the household's living situations and furnished floor plan layouts. The dwelling's capacity and range to house a residential process becomes the measure for the residential flexibility.

The method enables us to exemplify a residential process in the dwelling, projecting the different life phases that can appear during a selected time span. The short-term perspective on the dwellings spatial capacity is in this way visualized. The long-term perspective, relating to demographic changes, can be reflected by using different types of households and a longer time-span. This enables us to project the housings capacity to lodge different types of households during the lifecycle of the building.

### 5.1 The Space-Time Model

To present the Time Model and how it works, one example from the master studio work will be displayed. The floor plan presented is designed by two master students. The residential flexibility in the floor plan design is solved by the general room sizes, providing a diverse use of the residential space. The Time Model displays the apartment's residential use during both a short- and a long-term perspective, showing both the residential process for one household but also residential situations for diverse households, reflecting the capacity of the dwelling to respond to demographic changes.

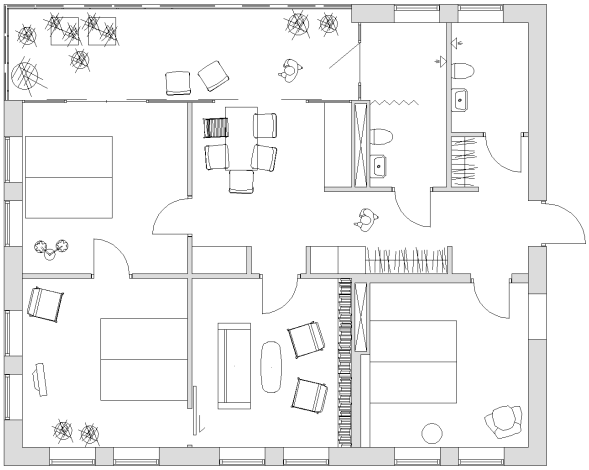
[3] See p 3, 4

**SPACE-TIME MODEL / GENERIC SPACE / MASTER STUDENTS**

**A: Cooperative household**

Apartment: Four room apartment, 70 sqm

Master students: Sofia Wendel, Ylva Frid



A-1

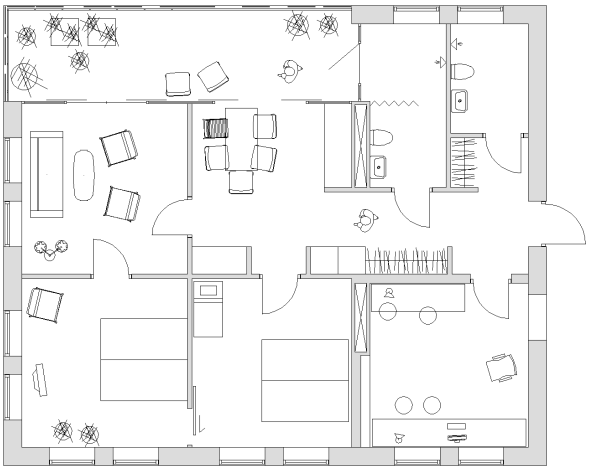
**Residential process**

A-1. STARTING:

Three couples share apartment. They have one private room each and a common kitchen and library.

*Comment from resident:*

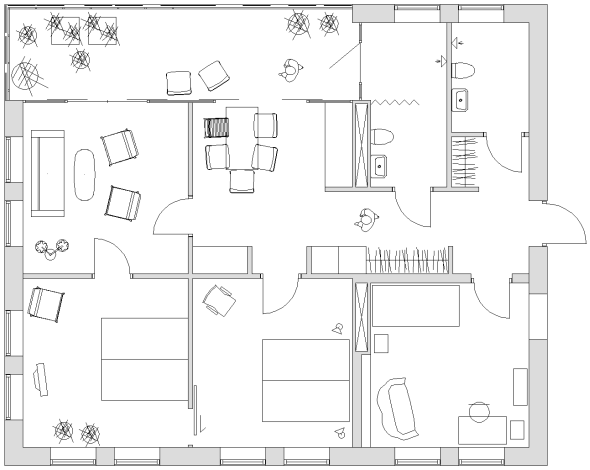
- We used to live in a larger apartment on our own but actually it was mostly left empty. It is great to share – always someone to talk to.



A-2

A-2. AFTER FOUR YEARS:

One couple have moved out. Two couples remain sharing apartment. One of the couples also by now have a child. The household have a common kitchen and living room. The room next to the entrance is used as office of one of the parents. This makes it possible for him to keep up his own private firm and be flexible with parenthood and work.



A-3

A-3. AFTER EIGHT YEARS:

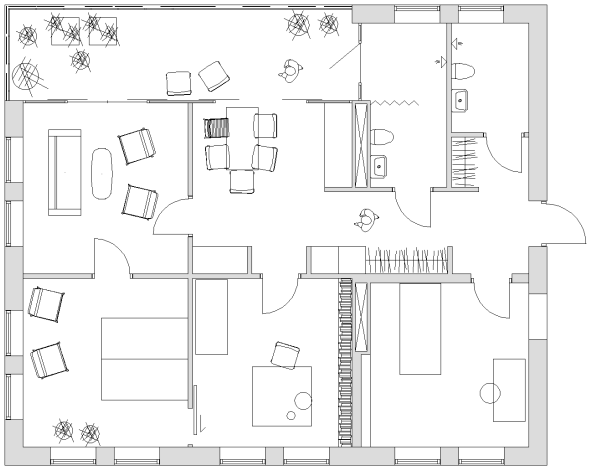
The two couples still share apartment. The child is now four years, by now she has her own room.

**SPACE-TIME MODEL / GENERIC SPACE / MASTER STUDENTS**

**B: Generational living / or Renting one room out**

Apartment: Four room apartment, 70 sqm

Master students: Sofia Wendel, Ylva Frid



B-1

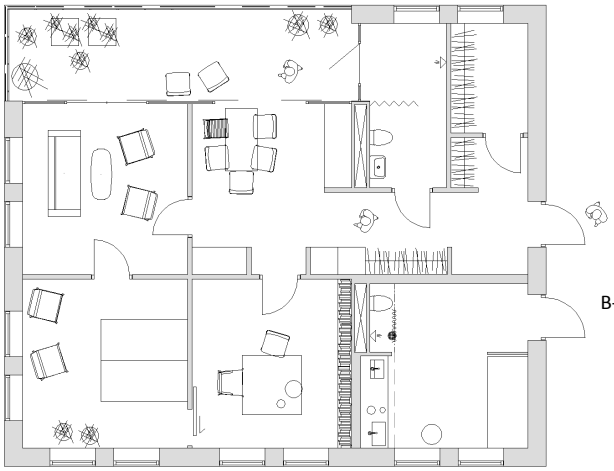
**Diverse residential examples**

B-1. GENERATIONAL LIVING:

One couple with a young child live together with the grandmother.

*Comment from parent:*

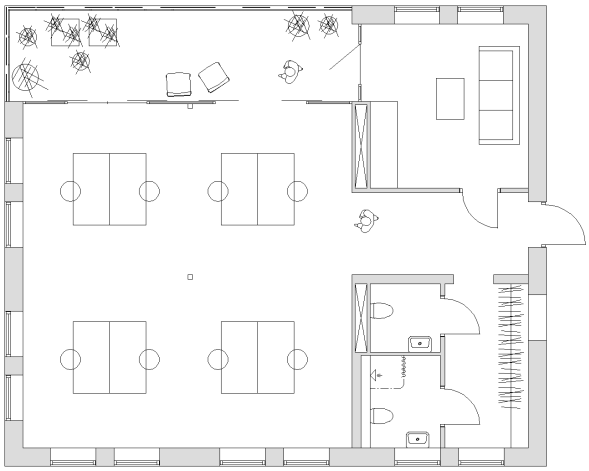
- Of course I feel bad about working so much. I wish I could spend more time with my son, but it's great to have mum here.



B-2

B-2. HOUSEHOLD WITH TENANT:

An older couple have split the apartment so that they can rent one room out and still be fairly undisturbed. They rent out to a young student at Chalmers University of Technology.



B-3

B-3. HOUSING SURPLUS

ON MARKET:

The apartment is transformed to office to adjust to market requests.

## 6 Discussion

The proceedings with the research by design in master studios needs to be critically assessed. It is also of importance to comment upon the purpose of developing an alternative approach on the work with residential design.

When reflecting on the studio work, it was based on vague directions and did not have a clear structure. A strict focus on developing a specific method could have provided possibilities to be more systematic in the research. This could have broadened the spectrum of possible proceedings to work with the time aspect as a method in the design work with residential floor plans. The emerged Space-Time Model is regarded as providing more knowledge of what issues that needs to be addressed and discussed within the design practice with residences. The model though, cannot be regarded as the complete answer to what can be a final solution to the residential design task.

The thesis work unfolds critical aspects on the existing standards for residential floor plan design. The current focus on the nuclear family as a departure for the design results in dwellings with a limited capacity to counter current and future residential needs from a sustainability perspective. This current housing standard constitutes a static framework that has no capacity to adjust to changing preconditions. In this context it is relevant to question every new standard or proceeding suggested as a framework for residential floor plan design. The Space-Time Model preconceives specific cultural residential patterns and a number of selected household types as a starting point for the residential floor plan design. This framework can be questioned in the same way as the current standards. The presumed cultural residential patterns can be seen as relevant today, but the perspective will have to be adjusted to counter future transformations of residential patterns and demographic changes. This conclusion advocates a residential design standard responding to the changed demographic preconditions.

It is believed that space and time, *spatial flexibility* and *residential process*, constitutes critical factors for residential practice. They are considered as relevant factors for residential design, opening a perspective towards a paradigm shift within design thinking. Further exploration of these factors as preconditions for residential floor plan design and residential qualities can enable a more comprehensive understanding of how residential design can answer to residential needs and provide sustainable residential solutions.

## References

Boström, M. 2012. “A missing pillar? Challenges in theorizing and practical social sustainability: introduction to the special issue.” *Sustainability: Science, Practice, & Policy,* 8(1): 3-14

Brand, S. 1994. *How Buildings learn: What happens after they’re built*. New York: Penguin Books

Dempsey, N., Bramley, G., Power, S., and Brown, C. 2011. “The social dimension of sustainable development: defining urban social sustainability.” *Sustainable Development* 19(5): 289– 300

Duelund Mortensen, P., Welling, H, G., Livö, M. and Wiell Nordberg, L. 2006. “Situations of dwelling – dwelling suiting situations.” *Nordic Journal of Architectural Research*, 9(3)

Dyson, T. 2012. *Population and Development, the Demographic Transmission*. London: Zed Books

Eldonk, J. V., and Fassbinder, H. 1990. *Flexible Fixation: The Paradox of Dutch Housing Architecture= de paradox van de Nederlands woningbouw.* Assen: Van Gorcum

Friedman, A. 2002. *The Adaptable House*. New York: McGraw-Hill

Gromark, S., et al. 2014. 'Integrative Ways of Residing: Health and Quality of Residence. A Concerted Trans-Disciplinary Research Effort - AIDAH ‘14-‘18. Architectural Inventions for Dwelling, Ageing and Healthcare', *ARCH14*; Helsinki SF Aalto University 19-21 Nov 2014.

Haase, A., Kabisch, S. and Grossmann, K. 2011. *Residential Change and Demographic Challenge*. Farnham: Ashgate

Habraken, N.J. 2011[1961/72]. *Supports: an alternative to mass housing*. London: Architectural Press

Hamdi, N. 1990. *Housing without Houses: Participation, flexibility, enablement*. New York: Van Nostrand Reinhold

Leupen B. 2006. *Frame and Generic Space. A Study into the Changeable Dwelling Proceeding from the Permanent.* Rotterdam: 010 Publishers

Lindén, A-L. 1995. ”Bostäder och hushåll: nuläge och framtid.” [Eng. Housing and Households: Now and in the Future]*Volym 19, Rapport från forskargruppen Boende och bebyggelse, Sociologiska institutionen Lunds universitet*

Manum, B. 2006. “Apartment Layouts and Domestic Life: The Interior Space and Its Usability a Study of Norwegian Apartments Built in the Period 1930-2005.” PhD diss. Oslo School of Architecture and Design

Murphy, K. 2012. “The social pillar of sustainable development: a literature review and framework for policy analysis.” *Sustainability: Science, Practice & Policy* 8(1)

Nylander, O. and Eriksson, A. 2009. *Så använder vi våra bostäder*. [Eng. Residential Use] Stockholm: AB Svensk Byggtjänst

Nylander, O. and Braide Eriksson, A. 2011. *Nya svenskar – Så använder vi våra bostäder*. [Eng. Residential Use – New Swedes] Stockholm: AB Svensk Byggtjänst

Paadam, K., et al. 2015 (forthc.). 'From Housing to Residing. Editors' introduction.', in Gromark, et al. (eds.), *Ways of residing in transformation - Interdisciplinary perspectives.*; London: Ashgate

Priemus, H. 1993. “Flexible housing: fundamentals and background.” *Open House International*, 18:19-26

SCB. 2009. The future population of Sweden, Statistics Sweden 2009, Demografiska rapporter 2009:1

Schneider, T. and Till, J. 2007. *Flexible Housing*. Oxford. Architectural Press, Elsevier

WCED. 1987. Report of the World Commission on Environment and Development: Our Common Future, UN Documents, Accessed January 2015: http://www.un-documents.net/wced-ocf.htm