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Contemporary Apartment Flexibility Regarding Human Needs

Santa Freimane
Riga Technical University, Riga, Latvia

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Keywords

Apartment architecture, contemporary housing, housing flexibility, residential environment.

Abstract

Considering the broad variety of household types as well as future generation needs and negative impact of often housing modifications, flexibility is a crucial aspect. The research aims to evaluate to what degree Riga contemporary apartment layouts meet human needs in terms of flexible housing. The theoretical framework is based on relevant literature review. Empirical studies are based on the assessment of selected case studies. The major findings show that there is a limited housing flexibility especially in the case of the compact apartment sector. To ensure greater housing flexibility, a number of key indicators should be incorporated into the building codes.

Introduction

Human needs are a crucial aspect in terms of housing. Unmet human needs may cause significant conflicts and pathologies for individuals and the whole society. In turn, human oriented design elevates the quality of housing and contributes to sustainability. There are various aspects which may influence human needs regarding housing such as a life stage, lifestyle, household type and others. These aspects impact the requirements for room size, furnishing, etc. However, multi-apartment buildings are designed for an average household type and its needs. It has been argued that the lack of quality in the original housing design, leads to modifications which occupants make to make their housing according to their needs [1]. Modifications made by occupants lead to significant material flows as well as have an impact on climate, thus raising questions about housing stock sustainability [1]. Herman Hertzberger argues that an architect should "contribute to creating an environment which offers far more opportunities for people to make their personal markings and identifications, in such a way that it can be appropriated and annexed by all as a place that truly 'belongs' to them" [2]. Moreover, population ageing and sustainability considerations of future generation needs, makes flexibility a crucial aspect of housing and overall built environment.

Flexibility has received a large amount of attention, and numerous studies have been carried out. However, the definition of flexible housing is still a debate, and in some cases the term 'adaptability' is used:

- "Adaptable housing is accessible housing that does not look different from other housing and which has features that in only minutes can be adjusted, added, or removed as needed to suit the occupants whether they are disabled, older, or non-disabled." ("Adaptable Housing: A Technical Manual for Implementing Adaptable Dwelling Unit Specifications" by James A. Bostrom Ronald L. Mace, AIA Maria Long, 1987) [17].
- "Flexible housing space has the ability to adapt to diverse users, but it also changes over time with the age of the inhabitants and the life cycle of the family." ("Flexible Housing" by Tatjana Schneider, Jeremy Till, 2007) [2].
- "We define adaptable buildings as dynamic systems that carry the capacity to accommodate a set of evolving demands regarding space, function, and componentry."

* Corresponding author. E-mail address: arch.santafreimane@gmail.com
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("A Paradigm Shift Towards Whole Life Analysis in Adaptable Buildings" by Manewa Anupa, et al., 2009) [17].

The discussion continues also on the type of flexibility and best approaches. For example, according to Montellano, housing layouts with three to four rooms in similar sizes and with non-bearing separating walls provides adaptability throughout decades [1]. While Till and Schneider claim that flexibility starts with elimination of inflexibility [4]. The study conducted in Oslo has concluded that apartments built in recent years do not reflect the contemporary diversity of housing preferences due to room sizes and layout configurations which make the interior space very certain in terms of functions [8]. In searches for practical guidelines several countries have issued special standards. That includes "Lifetime Homes" (UK), "Flex-Housing" (Canada), "Universal Housing" (Australia) [17], and "*Wohnungsbau, hindernisfrei – anpassbar*" (eng. Accessible Housing – Customizable) (Switzerland) with the focus on housing flexibility for possible disabilities of citizens.

Although there is a notable amount of scientific literature on the topic of flexibility, there is little information about contemporary apartment flexibility, especially in relation to human needs. The aim of this study is to evaluate to what degree Riga contemporary apartments meet human needs of housing flexibility specifically in three categories: personalization through room generality, adaption for ageing and disability, and consideration of future generation needs.

I. Research Objects and Methods

The first research method used is a literature review on housing flexibility. It was used in order to ground a theoretical framework and identify criteria according to which it is possible to evaluate the degree of housing flexibility. All newly built apartments in Riga have to accomplish the current building codes and related legislation. However, in Latvia and Riga, there are no particular rules in terms of housing flexibility. In order to gain empirical evidence on the topic, the case study method was used. Cases were selected by the following criteria: located in Riga territory; at least the first construction phase completed in the time period 2000–2020; includes at least 80 apartments in at least 2 buildings; and housing unit layouts are available. Moreover, to ensure that the sampling represents enough diversity of the total contemporary housing stock, the selected cases were verified according to the following attributes: variety of price points, different developers, and variety of location within the city. In total 31 apartment layouts were analysed. Since vast majority of housing flexibility criteria are expressed in a graphical way, the analysis of the cases was done graphically. The main findings of the research are summarised according to each assessment domain. Since evidence shows a significant difference between generous and compact apartment flexibility, the findings are divided into these two groups. Examples are chosen so that they reveal the most typical/common housing flexibility situations of each group – generous/compact and are supplemented by a description. Furthermore, this study summarises findings through SWOT analysis, thus identifying strengths, weaknesses, opportunities, and threats of the current situation in terms of contemporary housing flexibility.

II. Results of the Literature Review

A. Housing Flexibility

"Flexible housing can be defined as housing that is designed for choice at the design stage, both in terms of social use and construction, or designed for change over its lifetime" [2]. In other words, "flexible housing space has the ability to adapt to diverse users, but it also changes over time with the age of the inhabitants and the life cycle of the family" [3]. As stated by Till and Schneider, flexibility starts with elimination of inflexibility. This can be achieved in several economically effective ways – by reduction of load bearing internal partitions and roof constructions, by technological consideration, and by avoidance of rooms which can serve only for particular purpose or accessed only in one way [4]. Housing flexibility enables adaptation to the individual needs and preferences of the occupants, different numbers of users, family life cycle, ageing and disability, and changes in the function and allows application of modular and prefabricated solutions as well as considers the fourth dimension of architecture – time [3]. Furthermore, opportunities to adapt housing allows a prolonged lifespan of the buildings and the avoidance of re-constructions, and related material flows [1]. Although there are a lot of benefits in favour of the flexibility approach, there are also oppositions which argue that flexibility is a "false neutrality". In the 1980s, James Stirling stated that he was "sick and tired of the boring, meaningless, non-committed, faceless flexibility and open-endedness of the present architecture" [2]. Moreover, Brand argues that adaptability is rarely a part of the design concept [1]. One of the main obstacles is the higher up-front costs as well as a lack of evidence of actual economic benefit [1].

B. Housing Personalization

It has been argued that personalisation can be a key to achieve a sustainable residential environment and is an important aspect because "home environment is an extension of man's existence and personality; hence, man

is an agent of environmental change and not merely a recipient of environmental influences" [5]. Moreover, it is argued that population satisfaction with their homes is an important aspect for the whole society. Through housing personalization, there can be increased occupant satisfaction, which contributes to the sense of belonging, identity, and community formation. This, in turn, can raise quality of life as well as public health [6]. Rapoport stated that "personalisation is a way to establish user meaning of the built environment" [5]. However, Brierly pointed out that in housing design it is difficult to meet the precise needs of the occupants due to differences between users' and designers' values [5]. Through personalization and territorial control, self-esteem can be achieved in the form of proof of ownership, sense of identity, security, place attachment, and others, which all contribute to increase of user satisfaction [6]. Personalization is a continuous process and demands users' participation. According to Altman, one should be able to shape, manipulate, and alter his environment. Wilkinson argues that when residents are involved in the decision-making process of their residential environment and housing, there is a greater potential to create environments which are safer, more cared for, as well as tailored to user needs [5].

The decisions of housing personalization are influenced by a variety of factors, including housing market situation, regulations, financial situation etc. [5] And there can be a range of personalization types, starting from changes of colour and decoration till modification in the layout, function, form and volume of existing spaces [6]. However, personalization can be achieved relatively easily through room generality because a general room allows interchangeability of activities. Factors which impact rooms generality are size, form, access, link to other rooms, daylight conditions, technical equipment, and the placement of windows [1]. In the real estate market, the number of rooms commonly is seen as a more significant aspect than the size of rooms. This leads to the situation of "tight-fit functionalism", which means that rooms can be used only in a predetermined way due to their size and shape [2]. According to Ledent, a general room is 4 × 4 m. Moreover, he argues that each housing unit should have at least one such room [1]. Yunitsyna states that a room with an area of more than 12.4–16.4 m^2 and a minimum width of 3.1 m is general, in turn, rooms with less than 8 m^2 and width less than 2.2 m are specific [1]. According to the Auckland's design manual it is suggested that a minimum width of 3.2 m allows to place secondary furniture as well as allows more flexibility in furniture arrangements, while minimum width of 2.8 m is limiting the room's flexibility [7]. The study conducted in Oslo has concluded that apartments built in recent years do not reflect the contemporary diversity of housing preferences due to room sizes and layout configurations, which makes the interior space very certain in terms of functions [8]. In previous centuries living rooms and bedrooms were more or less equal in size and accessed through neutral corridors, thus allowing general use for each room. It has been argued that the living room has become a pass-through area, thus hindering opportunities to use this space as a temporary bedroom or for other purposes. Moreover, it can be problematic in usage for households with different working hours [1].

C. Housing for Ageing and Disability

In accordance with rights to adequate housing "housing is not adequate if the specific needs of disadvantaged and marginalized groups are not taken into account (such as the poor, people facing discrimination, persons with disabilities, victims of natural disasters)". To ensure an adequate built environment for people with disabilities, commonly terms such as barrier-free design, accessibility, and universal design are used [9]. Existing studies show that most of disabled people want to live independently and wish for such housing characteristics which allow them to do so [10]. Also, population ageing is a crucial factor, since the proportion of persons with physical or sensory limitations is greater among elderly [9]. In order to ensure long-term focused housing delivery, consideration of the context in terms of health needs and population ageing and related changes in planning regulations are necessary [11]. According to the statistics, in OECD countries the share of persons over 65 years was 7.7 % in 1950 but is expected to rise to 25.1 % in 2050 [12]. Not only people with disabilities and elderly are facing limited possibilities of movement. There are a variety of circumstances which may limit a person's possibilities to move, including a pregnancy or a broken leg [9]. In the last years, more attention has been focused on promotion of independence of elderly by accessible and adaptable homes. It has been recommended that all new housing by default should accomplish a higher accessibility grade to ensure lifetime home standards [13]. Moreover, it has been widely proven that costs of nursing home care are significantly higher than the costs of home care (even in cases when the value of assistive home care services is included) [10].

In the UK it has been suggested that "bathrooms and toilets should be capable of being converted to disabled standards and large enough to allow for carers to provide assistance" [14]. The UN Habitat as well as Swiss specialist agency for handicapped-accessible building (*Schweizerische Fachstelle für behindertengerechtes Bauen*) both have issued guidelines which include suggestions for adaptable housing for ageing and disability. That includes such recommendations as 1.20 m wide corridors, door clear openings at least 0.85 m wide, clear manoeuvring areas of 1.40 × 1.70 m or 1.50 m radius, etc. [9], [15]. Unlike other countries, Latvia has no policies or recommendations which directly regulate or encourage housing unit flexibility.

However, Latvian building codes of multi-apartment buildings request several accessibility requirements for common areas such as accessible entrances and elevators with min. internal dimensions of 1.1 × 1.4 m, etc. Additional requirements are in case of apartments which are specially designed for persons with disabilities [16], but that limits housing choices for certain groups of society.

D. Housing for Future Generation Needs

Flexibility is a significant element of housing to ensure its viability in social, economic, and environmental dimensions [2]. Despite the rapidly changing situations, the built environment is lacking capacity to answer to these changes [9]. To meet new legal and technical requirements, to modernise or satisfy changing social needs, most of the buildings are rebuilt during their lifetime [1]. Due to short-term economic thinking, there is a trend to design buildings which are in accordance with a certain household type at a certain time point [2]. Femenias points out that modifications made by occupants lead to significant material flows as well as have an impact on climate, thus raising questions about housing stock sustainability [1]. Till and Schneider suggest that flexibility starts with elimination of inflexibility which can be achieved in several economically effective ways, for example, by reduction of load bearing internal partitions and roof constructions, by technological consideration, and by avoidance of rooms which can serve only for particular purpose or accessed only in one way [4].

Sustainable development is to "meet the needs of the present without compromising the ability of future generations to meet their own needs" [5]. In other words, sustainable development must have a long-term perspective which goes beyond current issues and looks for durable solutions and takes into consideration not only today's but also future people's needs [5]. There is a need to shift from short-term thinking to long-term thinking, thus considering uncertain needs of future occupation [2]. Furthermore, considering circumstances of COVID-19 pandemic, housing has to accommodate a wider range of functions than usual. These new obstacles are a catalyst for creation of extra space or new housing zoning. Division of spaces can create a temporary bedroom, a place for home-office, studies, leisure, hobby or other purposes.

In accordance with the UK Public Housing Scheme Development Standards, it is recommended that housing should be designed in such a way that it allows internal remodelling in the future [2]. Mies van der Rohe declared that the frame construction is the most suitable approach in order to adapt to the changing needs of the occupants due to the great variety of possible layouts. Similarly, Till and Schneider state that for flexible considerations, housing layouts should have a core with kitchen and bathroom facilities. The rest area should have the ability for a variety of zoning and separation with light weight construction [1]. Moreover, Till and Schneider pointed out that, ideally, the architect should have done studies on how given space can be re-planned, so the best placement of elements such as staircases can be chosen [4].

III. Apartment Assessment in Terms of Housing Flexibility

E. Assessment Criteria

From the literature review, the main housing flexibility criteria according to their major domain can be identified. In the domain of personalization, housing can be used in a variety of ways according to the personal needs and preferences of the household if the rooms are general. Room generality depends on its size, shape and wall opening location. In terms of ageing and disability, the most important factor arises is space requirements for each functional group of the housing. If there is enough space provided, it is easily possible to adapt the housing for new needs in case of ageing in place or disability, thus enabling occupants to accomplish daily tasks of cooking, washing, etc. without further construction investments. Although the future is uncertain and debate on future generation needs can be speculative, Till and Schneider, have pointed out that, ideally, the architect should have done studies on how given space can be re-planned [4]. Based on that, the author of the article proposes two possible scenarios – the need to create several spaces, which can be done through space division. Or the opposite – merging spaces, thus creating open layout. Assessment criteria are represented in Table I.

F. Findings

The findings of the assessment of case studies have revealed typical issues in each flexibility domain. Furthermore, it has shown that contemporary apartment layouts can be grouped into two categories – generous apartments with relatively large total apartment area and compact apartments with a relatively small apartment area. For this reason, findings are also represented into these two groups, thus giving an opportunity to compare apartment flexibility depending on the apartment area, which in most cases means also the price level groups, since upper-class apartments tend to provide more space. Examples of the most typical situations are shown supported by description (Table II). In cases of several similar layouts, the example with the most regular/conventional situation in terms of flexibility is chosen, thus reflecting the most common/average case.

TABLE I

Assessment Criteria of Housing Flexibility [adapted from [1], [2], [7], [8], [9], [15]]

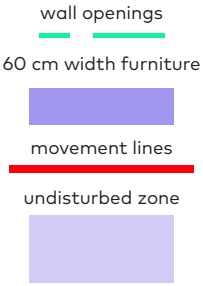
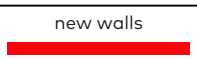
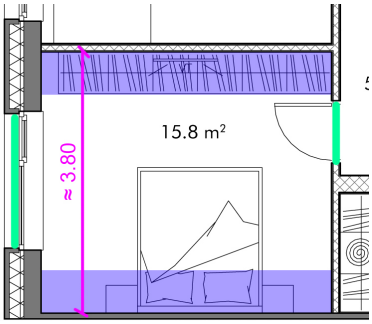
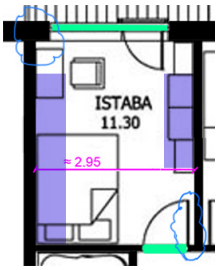
Domain of housing flexibility	Assessment criteria	Indicators	Graphical symbol
Personalization through room generality		Adapted from [1], [2], [7], [8]	
	Room area *Master bedroom* *Secondary bedroom* *Living room*	 at least 14.00 m² at least 12.00 m² area at least 26.00 m² area (18.00 m² living room + 10.00 m² kitchen)	
	Room width *Bedroom*	 at least 3.1 m	
	Room form and proportions *All rooms*	 neutral form with adequate proportions (1:1...1:1.6)	
	Wall openings / furnishability *Master and secondary bedroom* *Living room*	 door and window arrangement allows 60 cm width furniture on both sides of the room door and window arrangement which allows relatively undisturbed usage of the space, no "pass-through" situation	
Ageing and disability	Criteria adapted from [9], [15]		
	Entrance/clear manoeuvring space	min dimensions of 1.40 × 170 m	
	Bathroom	min dimensions of 1.80 × 2.35 m	
	Kitchen	min width of 1.40 m (1-wall kitchen) min width of 1.20 m (2-opposite-walls kitchen)	
	Master bedroom	min width of 3 m and min area of 14 m²	
	Secondary bedroom	min width of 3 m and min area of 12 m²	
	Balcony or other outdoor space	min 2 m deep	
	Corridor	min width of 1.20 m	
Future generation needs	Criteria proposed by the author based on the statement of Till and Schneider that, ideally, the architect should have done studies on how given space can be re-planned [4]		
	Scenario 1	Ability to separate the kitchen and living room	
	Scenario 2	Ability to create open layout	
	Problem areas		

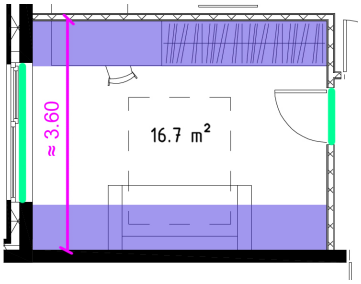
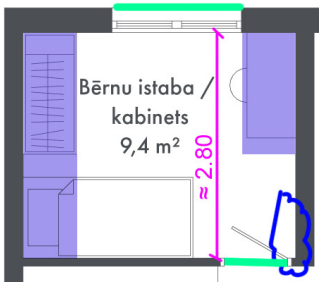
TABLE II

The Main Findings on Contemporary Apartment Flexibility [by the author, layouts from [18]–[28]]

<table>
<tr><th colspan="3">Example of generous layouts with relatively large total apartment area</th><th colspan="3">Example of compact layouts with relatively small total apartment area</th></tr>
<tr><th colspan="6">Personalization through room generality</th></tr>
<tr><td>room width</td><td>wall openings</td><td>60 cm width furniture</td><td>movement lines</td><td>undisturbed zone</td><td>problem areas</td></tr>
<tr><td>
</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Master bedroom</td><td colspan="2">
</td><td colspan="3">
</td></tr>
<tr><td colspan="2">Project Gaiļezera nami, layout from [18]
Master bedroom 15.8 m²

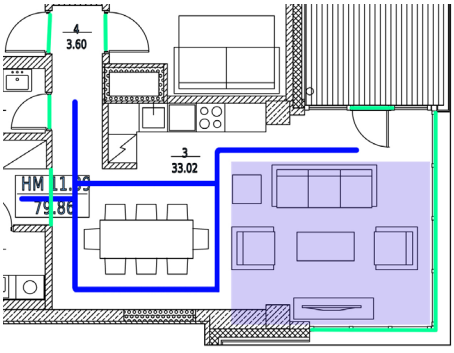
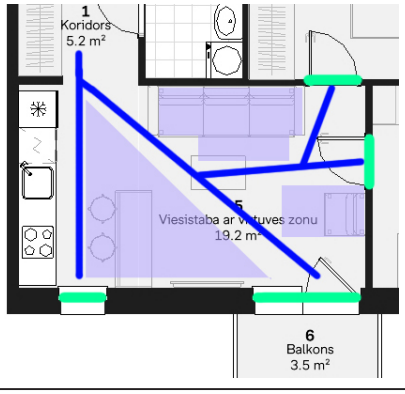
+ sufficient area for general usage
+ adequate proportions (1:1.1), form and width for a variety of furnishing options
+ location of the door and window allows 60 cm width furniture on both sides of the room</td><td colspan="3">Project Meža ciems, layout from [19]
Master bedroom 11.30 m²

+ neutral form and adequate proportions (1:1.3)

- insufficient area for general use of the room
- deficient width for general use
- location of the door and window limits furnishing options</td></tr>
<tr><td rowspan="2">Secondary bedroom</td><td colspan="2">
</td><td colspan="3">
</td></tr>
<tr><td colspan="2">Project Skanstes parks, layout from [20]
Secondary bedroom 16.7 m²

+ sufficient area for general usage of the room adequate to accommodate 2 persons
+ adequate proportions (1:1.3), form and width allow variety of furnishing options
+ location of the door and window allows 60 cm width furniture on both sides of the room</td><td colspan="3">Project Liepziedi, layout from [21]
Secondary bedroom 9.4 m²

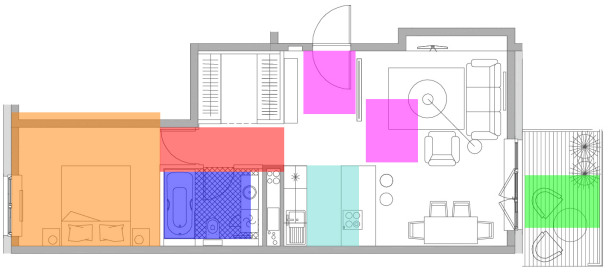
+ neutral proportions (1:1.2) and form
+ location of the window allows 60 cm width furniture on both sides of the room

– insufficient area for general use
– deficient width for variety of furnishing options
– location of the door does not allow to put furniture behind it</td></tr>
<tr><td>Living room</td><td colspan="2">
</td><td colspan="3">
</td></tr>
</table>

	Project *Filozofu rezidences*, layout from [22] Living room/kitchen area 33.02 m² + sufficient area for general usage of the space + adequate proportions and form for variety of furnishing options + location of the doors and transit areas allows relatively undisturbed usage of the space	Project *Krasta kvartāls*, layout from [23] Living room/kitchen area 19.2 m² + neutral proportions (1:1.2) and form – the area is insufficient for general use of the space – location of the doors and transit areas limits the variety of furnishing options as well as does not allow undisturbed usage of the space, "pass-through" situation

Ageing and disability

Entrance/clear manoeuvring space	Bathroom	Kitchen	Master bedroom	Secondary bedroom	Balcony or other outdoor space	Corridor
min dimensions of 1.40 × 170 m	min dimensions of 1.80 × 2.35 m	min width of 1.40 m (1-wall kitchen) min width of 1.20 m (2-opposite-walls kitchen)	min width of 3 m and min area of 14 m²	min width of 3 m and min area of 12 m²	min 2 m deep	min width of 1.20 m

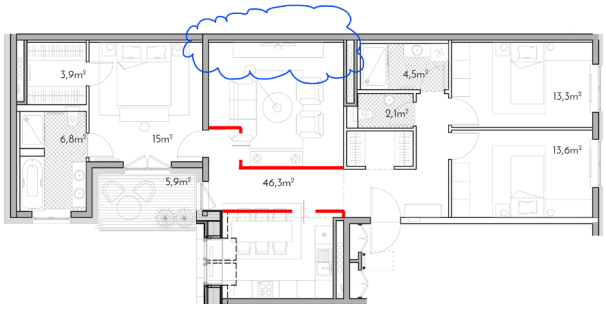
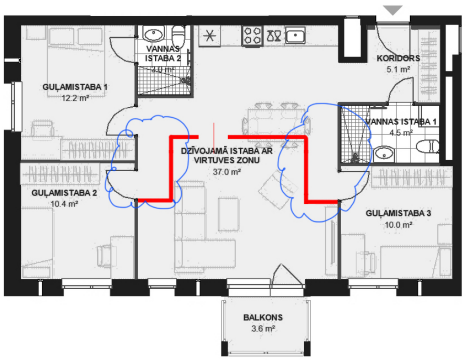
1-bedroom apartment		
	Magdalēnas kvartāls, layout from [24] 53.50 m² (apartment) + ≈ 6 m² (balcony) + enough clear manoeuvring space at entrance and living room + sufficient depth of the balcony + adequate bathroom size and proportions – insufficient master bedroom size (12.2 m²); however, it could be adequate for 1 person – not enough space in between kitchen lines – slightly insufficient width of the corridor	*Dreilinga mājas*, layout from [25] 37.4 m² (apartment) + 3.7 m² (balcony) + enough space in kitchen area + sufficient clear manoeuvring space at living room and entrance area (if the wardrobe furniture is relocated or reduced) – the bedroom area is too small even for one person – inadequate corridor dimensions – insufficient depth of the balcony – insufficient bathroom width
2-bedroom apartment		
	Centrus, layout from [26] 115.1 m² (apartment) + 7.7 m² (balcony) + sufficient area with adequate proportions of both bedrooms + sufficient area with adequate proportions of both bathrooms + enough clear manoeuvring space at entrance and living room + adequate kitchen width + sufficient corridor width – insufficient depth of the balcony	*Akācijas*, layout from [27] 53.5 m² (apartment) + 6.2 m² (balcony) + enough clear manoeuvring space at living room + adequate kitchen width (if dining table furniture is removed) – insufficient area of any bedroom – inadequate entrance area – insufficient bathroom width – slightly insufficient width of the balcony – slightly insufficient width of corridor

<table>
<tr><td rowspan="2">3-bedroom apartment</td><td></td><td></td></tr>
<tr><td>Skanstes Parks layout from [20]
122.7 m² (apartment) + 11.7 m² (balconies)

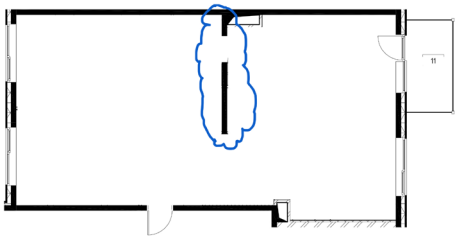
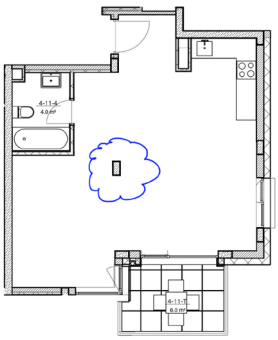
+ sufficient area with adequate proportions of all bedrooms
+ sufficient area with adequate proportions of both bathrooms
+ enough clear manoeuvring space at entrance and living room
+ adequate kitchen width (if the dining table is relocated)
+ sufficient corridor width

– insufficient depth of the balcony</td><td>Trebū Homes layout from [28]
79.5 m² (apartment) + 5.8 m² (balcony)

+ sufficient clear manoeuvring space at living room and entrance area
+ adequate kitchen width
+ sufficient width of the balcony
+ adequate area and proportions of bathroom

– insufficient area and/or proportions of bedrooms
– insufficient width of the main corridor</td></tr>
<tr><td colspan="3">Future scenarios</td></tr>
<tr><td colspan="2">new walls</td><td>problem areas</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td rowspan="2">Scenario 1 – Room division</td><td></td><td></td></tr>
<tr><td>Project Magdalēnas kvartāls, layout from [24]

If the living area and kitchen are separated to create closed rooms, then the living room is going to lose natural light and ventilation, which are crucial aspects for functional usage of apartment rooms.</td><td>Project Dreilinga mājas, layout from [25]

In order to separate the living area and kitchen, but at the same time maintain entrances in other rooms, corridors are formed. Moreover, the kitchen loses natural light and ventilation opportunities.</td></tr>
<tr><td rowspan="2">Scenario 2 – Open layout</td><td></td><td></td></tr>
<tr><td>Project Skanstes Parks, layout from [20]

Load-bearing wall in the interior. In the case of re-planning, this apartment can be divided into two areas. Considering the total area of the apartment, there are a variety of possible layouts.</td><td>Project Trebū homes, layout from [28]

One load-bearing column in the interior. A variety of open plans are possible.</td></tr>
</table>

The findings of the assessment have revealed that in case of generous layouts, rooms have sufficient area for general use. Larger area allows to locate doors and windows so that both sides of the room can be furnished. Moreover, the kitchen and living area can be planned in such a way that they can be used relatively undisturbed. In turn, compact layout limits not only room generality due to insufficient area, but it also limits furnishing options. In compact layouts one of the most typical issues is that the doors and windows are located too near to the walls, which limits the possibilities to furnish the room. Location of doors and windows in compact apartment layouts is problematic also in terms of living room generality, where it creates the "pass-through" situation. This hinders the opportunity to use these spaces undisturbed. Similarly to room generality criteria, also the capacity of adaptation for ageing and disability varies in generous and compact apartment layouts. Apartments with greater total area are mostly able to deliver sufficient space in bedrooms, bathrooms, as well as entrances and kitchen. However, in some cases, the corridors are slightly deficient in width or the balconies do not have enough depth for comfortable use. In turn, compact layouts suffer from inadequate space dimensions throughout functional groups, which leads to very limited opportunities to adapt them in case of ageing or disability. In terms of future generation needs, both – generous as well as compact apartments can have issues because this flexibility domain depends on the layout configuration and used construction system, rather than on the provided area itself. In the first scenario – separation of kitchen and living room, the typical issues are creation of extra corridors, in order to provide access to rooms, as well as loss of natural light and ventilation opportunities, due to the separation. The case of the second scenario – the capacity to create an open layout, shows that both generous and compact apartments may have load-bearing internal elements. Although internal elements can limit the opportunity to use spaces differently than in the original layout, mostly they can be incorporated in new layout options. The strength, weaknesses, opportunities as well as threats of the current situation in terms of contemporary apartment flexibility are represented in Table III.

TABLE III

SWOT Analysis of Contemporary Apartment Flexibility in Riga [by the author]

Strength	**Weaknesses**
There are some contemporary apartments which accomplish flexibility criteria, thus allowing their inhabitants to tailor their housing to their needs, as well as are sustainable in the sense of future uncertainties, without the need of large financial costs or material resources.	There are identified contemporary apartments which do not reflect housing flexibility, thus hindering opportunities for some households to adapt their dwellings to their needs, as well as make this housing stock less sustainable. The difference in housing flexibility between generous and compact apartment layouts creates a housing quality gap and puts some households in a worse position, thus increasing inequality in life conditions. Unlike other countries, Latvia has no policies or recommendations which directly regulate or encourage housing unit flexibility. Moreover, the current legislation allows such a minimum standard which is not compatible with flexible housing. The most typical flexibility issues are: door and window location too near to the walls; insufficient area and width of rooms for general usage; "pass-through" situations; insufficient space dimensions, especially corridors and balconies, for comfortable usage for disabled persons; the loss of natural light and ventilation options, and creation of extra corridors, in case living room and kitchen must be separated.
Opportunities	**Threats**
Incorporation of the minimum requirements of housing flexibility in building codes or housing standards in order to achieve greater overall housing quality. Since housing flexibility is related to longer life-span of the buildings and is considered as an approach to reach sustainability, promotion of housing flexibility could be encouraged through policy instruments such as taxes.	Larger housing areas are required in order to achieve greater housing flexibility. However, considering commonly known future uncertainties and economic development, the low purchase power can be a threat for reaching higher housing flexibility in near future.

Conclusions

This study gives an important insight into the topic of housing flexibility and helps to understand the main issues which can help to adjust existing building codes as well as to develop flexibility guidelines for further housing developments. The main findings reveal that there is a wide variety of strategies and solutions to ensure housing unit flexibility. The usage of these strategies has several benefits which contribute to the human needs and overall sustainability of the residential environment. This includes the opportunity to personalize homes for lifestyle and household type through room generality, as well as to adapt apartments in a case of disability. That, in turn, helps to reduce the necessity to move and allows people to stay in the same neighbourhood and keep their social networks. Nevertheless, flexibility which considers and allows to accommodate future generation needs expands the lifespan of the buildings and reduces unnecessary financial and resource investments. Unlike other countries, Latvia has no policies or recommendations which directly regulate or encourage housing unit flexibility. Moreover, the current legislation allows such a minimum standard which is not compatible with flexible housing. There can be identified two main types of contemporary apartment layouts. The first one is a generous layout with a relatively large apartment total area. These types of apartments are able to ensure general usage of rooms as well as adaption for ageing and disability. The second housing layout type is compact one. In this case, there is a relatively small apartment total area, which limits the opportunities to provide general usage of rooms or adaptation for ageing and disability. However, both types of housing layouts may have issues to adapt for future generation needs due to load-bearing internal elements, layout configuration, room connectivity, and window placement. The most typical issues identified in this study are: door and window location too near to the walls; insufficient area and width of rooms for general usage; "pass-through" situations; insufficient space dimensions, especially corridors and balconies, for comfortable usage for disabled persons; the loss of natural light and ventilation options, and creation of extra corridors, in case living room and kitchen must be separated. Furthermore, the difference in housing flexibility between generous and compact apartment layouts creates a housing quality gap, thus increasing inequality in life conditions of different households. In order to increase housing flexibility in future developments, there should be incorporated measurable indicators in building codes and developed housing flexibility guidelines.

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Santa Freimane received a degree of Bachelor of Architecture in 2013, Diploma of Architect in 2015, and Master of Architecture in 2017 from Riga Technical University. Since 2017, she has been a PhD student with the Faculty of Architecture of Riga Technical University. She participated in the Erasmus exchange program at the Polytechnic University of Valencia in 2013. She has been developing her professional skills in several architecture offices in Latvia, Italy, Spain, Germany, and Switzerland. Her main research focus is on the quality of contemporary residential environment. She has received the Architect Jānis Alksnis Award in 2017.

Contact Data

Santa Freimane
Faculty of Architecture, Riga Technical University
Address: 6 Ķīpsalas St., Riga, LV-1048, Latvia
E-mail: *arch.santafreimane@gmail.com*