

Comparative analysis of three innovative housing models in Copenhagen for social mix

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Received: December 2018 • Final Acceptance: October 2019

Abstract

Copenhagen has been attracting residents both from abroad and other regions of Denmark, embracing a comprehensive development plan following an economic boom since the 1990s. Local decision-makers have been striving to transform the housing stock of the city in line with the evolving demographics of the city and consequent new demands of the urban society. At the same time, people are seeking cheaper and flexible alternatives of living; thus, social housing (almen bolig) emerges as an affordable option with reasonable qualities for Copenhagen residents. This study uses a comparative analysis to evaluate spatial approaches of three innovative social housing models developed by partnerships of some non-profit housing associations with Copenhagen municipality in 2015. Each model has a distinct motto; Generationernes Byhus (GBYH) builds up neighbourhood across generations; Boliger for Alle (BOFA) provides opportunity of transition across ownership types; and Almene Storbyboliger (ASBB) creates flexible/plastic system addressing demographical structure under change. Methodologically, the research is based on interviews with key stakeholders and in-depth analysis of visual and written documents. It provides a comparative analysis of the models, concentrating particularly on dwelling design approaches which address social mix and diversity. The paper concludes that although the social housing market is strictly controlled for socio-economic reasons, it still has the potential to support the evolution of the urban demography of Danish society thanks to embracement of innovative perspectives both by governmental authorities and forerunning housing associations.



doi: 10.5505/ituja.2019.04875

Keywords

Dwelling design, Households, Social housing, Social mix, Diversity.

1. Introduction

This study provides a comparative analysis of three innovative architectural models recently developed by collaborative works of social housing associations [HA] and architecture studios in Copenhagen. The models were developed at the invitation of the municipality of Copenhagen (KK- *Københavns Kommune*), calling for gathering partnerships to develop standardized housing concepts which both lower realization time and introduce new ways of thinking. HAs have to be organized to sustain life in the settlements and keep the apartments occupied to continue collecting rents. Thus, they have already invested time and resources by taking it as an opportunity to build on their operations. One common goal of these three models is to find spatial solutions to secure social mix within housing settlements. Although studies on social mix are in rise in the recent years, those focusing on urban and architectural design aspects are limited (Tiesdell, 2004; Lawton, 2013; Livingston, Kearns, & Bailey, 2013; Arthurson, 2010; Robert, 2007; Levin, Arthurson, & Ziersch, 2014). Aim of this study is to understand how pre-defined goals of achieving social mix are reflected in the most recent and ambitious social housing projects in Denmark - a country of social welfare which continuously invests in social housing to build its quality up-, and to find out commonalities or unique spatial approaches in response to the evolving needs of the society. The projects have not been implemented yet; but the architectural solutions suggested say much about the changing housing needs of the urban population as a result of recent transformation of the demography.

The current paper is structured in three parts. First, a background information regarding the partnerships between HAs and the municipality is introduced. Then, the methodology of the study is disclosed before contextual and theoretical frameworks are elaborated for a better comprehension. Following these sections, the results of the examination are disclosed case-by-case. Finally, a comparative discussion on all three cases is provided before the paper is concluded with final remarks.

1.1. Contextualization

The capital city began to attract many people, from Denmark and abroad, who sought for markets to invest or work in since the 1990s as a result of increasing national and international investments, and consequently, of its boosting economy. (Andersen, 2008). Copenhagen has attracted investors and particularly white-collar workforce causing an unprecedented rise in the population. The city's population was 500 thousand in 2015 and is expected to reach 600 thousand until 2025; corresponding to an average rise of ten thousand citizens per a year. Consequently, this rise creates a demand pressure on the housing stock and causes an increase in price and rents of housing units.

People who move to the city are mostly young people studying or working; living alone or with their families. As the prices rise many people face the problem of affordability and tend to live with others – their children, parents, friends, partners etc. However, as many of newcomers live with their families, this creates an extra demand on large housing units. Thus, families with children have a particularly difficult time finding affordable housing in the city. Besides, on the one hand, there are still a considerable number of young people, mostly students, who prefer to live alone, but are restricted by the limited, expensive, low-quality options in the market. (Figure 1) On the other hand, there is a non-negligible ratio of elderly population (60+) which equals to 14,1% in Copenhagen despite being in a trend of decrease since 1990s.

Social housing (*almen bolig*) refers to common housing for all, regardless

¹ This paper is based on a research study an earlier version of which is presented by the author as a conference paper at ENHR 2018 Conference in Uppsala with the name "Innovative Social Housing Concepts to Facilitate Social Mix: Three Conceptual Models in Copenhagen".

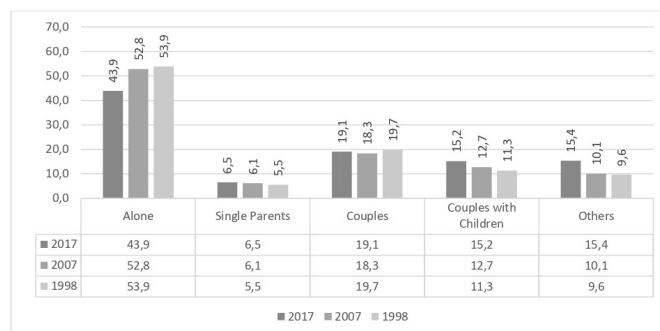


Figure 1. Households in Copenhagen between 1998 and 2017 (Data source: Municipality of Copenhagen).

of income levels, in Denmark. Anyone can register on a waiting list and move in the units once he/she gets the turn. In principle, this provides access for all income groups with different social backgrounds. Thus, the Danish sector is not prejudiced compared to that of other European countries. Nevertheless, many social housing estates house the most vulnerable citizens due to concentrated poverty, particularly among ethnic groups, as well as, social and security problems since the 1980s. Comprehensive transformation schemes have been developed to rehabilitate the settlements and their residents since the beginning of 2000s. The sector is strictly regulated by law, supported economically by local and national governments, and is supervised by complex control mechanisms regarded as a social and urban tool for the welfare of the society towards a sustainable future (Bican, 2016).

Today, many middle-income families prefer to live in social housing estates for their flexibility of choice of location in the city and their relatively cheaper rents in the market. Putting

those living alone -the largest household type in the city- aside, the sector houses a balanced distribution of different household types –couples with children, couples, single parents, others. (Figure 2) For many single parents, the sector is the top-most option to live in -35,7%- . (Figure 3)

1.2. Background of the collaboration between HAs and the municipality

In 2013, minister of city, housing, and regions gathered a group of researchers, specialists, academics, and leaders of built environment and urban culture under the name of “*Tænketanken – Byen 2025*”² (The Ministry of City, Housing, and Rural Districts, 2014) to find answers for the question “[h]ow do we keep, develop, and strengthen the Danish tradition of communal/shared living through development of our cities?” (pg.7) Concurrently a ministerial analysis report on income, education, and public support had shown that there was a tendency of segregation in major Danish cities, Copenhagen, Odense, Aalborg, and Aarhus.

The Think Tank [TT] defined three levels of common living (*fælleskab*) (1) across regions, (2) in the city (citizens’ common feeling of solidarity and tolerance for each other), and (3) in the near local environment (includes direct interaction and private acquaintance). TT proposed creating new forms of housing ownerships, new housing types for new patterns of living, cheaper housing options of good quality in varied housing forms and scale. TT urged municipalities to demand more variation than before in housing tenders in new housing areas concerning ownership, house types, target groups, size, common facilities, and interior arrangement.

Growing social inequality in the city was acknowledged in the municipal plan of 2015 (The Municipality of Copenhagen, 2015a). Thus, the city disclosed its target “to invest in housing for all income groups and mix different forms of housing” (pg.3) as a means to provide a coherent city life with diverse residential options. KK reserved a considerable share of its budget to support establishment of social housing (2500 of 8200 total dwellings to be construct-

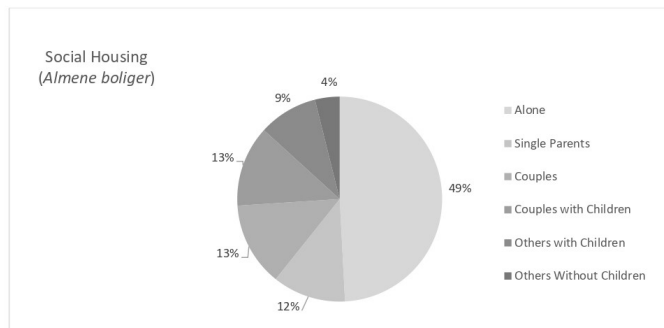


Figure 2. Household distribution in social housing market in Copenhagen in 2017 (Data source: Municipality of Copenhagen).



Figure 3. Households and housing types in Copenhagen in 2017 (Data source: Municipality of Copenhagen).

ed until 2025). Being aware of rising land prices and construction costs, KK decided to invest in new housing concepts which would match the changing housing demand and resident demographics in the city³. Therefore, in June 2015, an invitation letter was sent to HAs asking them to form partnerships to develop new standard concepts; find new ways of thinking and fit in different locations in the city; and reduce construction expenses by making use of economy of scale (*stordriftsfordele*) (The Municipality of Copenhagen, 2015b). An evaluation committee, consisting of the city architect, and representatives of the KK's technical and environmental departments, and the economy department, has decided on these three partnership projects of the following HAs:

- [GBYH] *Generationernes Byhus* (Urban House of the Generations) - KAB, SAB, AKB, B3B;

- [BOFA] *Boliger for Alle* (Houses for all) - Domea, FB Gruppen, NT Advokater

- [ASBB] *Almene Storbyboliger* (Common Large Urban Houses) - Lejerbo, fsb, aab.

2. Theoretical framework

The concepts of diversity, social mix, and social mixing are on the agenda of global housing markets and research. Diversity is a broad and comprehensive concept and refers to the variety of people, groups, places, functions etc. in a given area. Social mix, pronounced often in political discussions, is a relatively narrower concept referring to a mix of different social groups within the area. Social mix of the area may be subject to change either unintentionally; e.g. by ghettoization, or intentionally, by political preferences, planning decisions or urban and architectural interventions. Whereas, it should be noted that social mix and social mixing are different concepts, as the latter describes mutual behaviour of individuals or interaction among them (Livingston, Kearns, & Bailey, 2013). Therefore, it refers to “mixing between people on a spectrum from aloneness to close friendships” (Gehl Architects, 2016, p. 8) (Figure 4). In this paper, we will discuss the terms based on

their relationship with spatial design.

Social mix is a term usage of which goes back to more than a century ago; and often referenced in political arena and related research (Sarkissian, 1976). Social mix fundamentally describes co-presence of different groups (Levin, Arthurson, & Ziersch, 2014). Although its socio-economic dimension has mostly been embraced in political rhetoric, the concept bears further dimensions, such as, income, tenure, generation, and ethnicity (Arthurson, 2010). Furthermore, although the term is sometimes used to describe the condition acquired by “tenure mix” in a given area, the latter mix does not always ensure the former. Nevertheless, socio-economic homogeneity leads to social (class) segregation across urban lands (Arthurson, 2010).

For Bech-Danielsen et al. (2018) contemporary residential architecture prioritizes a mix of functions, housing types, and households, in contrast to modernist and functionalist architecture of post-war period. Comprehensive studies for different contextual conditions in large social housing schemes can be dated back to Habraken's work in 1962 (Habraken, 1972). Today, efforts are made “to create socially mixed urban and residential areas where high and low, young and old, meet through mixed ownership – housing for different stages of life, a housing that embraces socially disadvantaged groups” (Bech-Danielsen et al., 2018, pg.224). Bech-Danielsen et al. underline further that social mix does not only refer to that of social classes. The mix can be made of young people, families with children, pensioners, disabled, and the mentally vulnerable. Projects are developed to combine different types of dwellings by creating communal functions and public spaces facilitating places for meeting ‘other’ social groups. For

² *The Think Tank - The City 2025.*

³ *Louise Fogh Black (2017) of Aalborg University uncovers the significance of the strategic partnerships between the KK and social housing organizations in her report.*

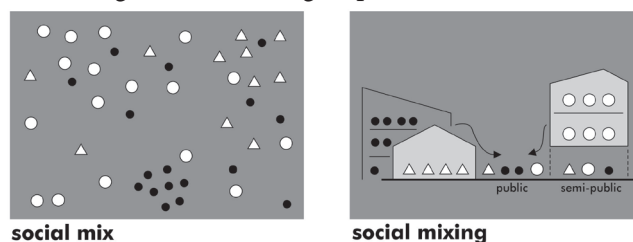


Figure 4. Social Mix and Social Mixing (Illustrated by the author).

the authors, this reflects “the welfare state’s call for tools of architecture and planning to come up new ways that the built environment can promote mutual understanding so that civil society can take on more of the task of caring for each other.” (pp.232-233)

Highlighting details of many concrete cases in the new residential development areas of Copenhagen, Mortensen (2018) explains how accessible design of the blocks and interiors, flexibility of dwelling plans, and common use of shared spaces are crucial concerns to which architecture and urban design directly contributes to. Architecture of dwelling units, building blocks, housing ensembles, the urban space in between, and the relative organization of all those elements critically affects the different subsets of diversity in a given residential area and the way residents act and react to each other. For him, “[t]he pursuit of diversity ... places demand on the architectonic design of these thresholds [between public and private], and on the planning process and the dialogue between owner, user, and planner” (pg. 32).

Despite a large usage in discursive sense adopted in local and national strategies, “there is a gap in knowledge regarding the design of social mix and the way socially-mixed communities are physically formed” (Levin et al, 2014, p.24). Tiesdell (2004), Lawton (2013), Roberts (2007), and Arthurson (2010) posit critical views among limited works discussing the design aspect of social mix, despite not having directly focused architectural properties of given settlements. For Tiesdell, “design dimension can be a means of adding value without extra cost.” However, it may also work for stigmatization. In any case, it can be affected by developers’ perspectives, as they basically prioritize profit-making by minimizing costs. Concentrating particularly on the socio-economic mix of residents, Tiesdell mentions two main design approaches in planning of mixed settlements: “integrated” (small clusters, pepper-potting) or “segregated.” Both approaches can be applied for settlements either with similar appearance or different appearance. The perspectives of the approaches and the appearance

can be cross-combined; and applied as “macro design” schemes. Further, Tiesdell defines “micro design” factors which change building appearances since they affect the social outcomes either negatively or positively. These factors include both elements of building structure and architectural elements like doors, windows, fittings, or gables. Tiesdell’s final remark is that “it is difficult to predict whether any particular arrangement will generate social interaction among ... residents” (pg. 210).

Investigating “tenure blind” developments with specific case studies, Roberts (2007) concludes that over-specific prescriptions, such as ‘pepper-potting’⁴, can be dangerous. Her research supports that, once principles of urban design are embraced and stigma-creating visual differences are avoided, different socio-income groups may interact (social mixing) and residents may be satisfied. Arthurson’s practice review in 2010 echoes with Robert’s study in that “too fine-grained scale of social mix” can potentially result in conflicts as much of the literature concludes. Additionally, she highlights Danserau et al.’s (1997) finding that social mix strategies work better in neighbourhood scale, but not desirable within buildings or housing clusters. Rather, it is more appropriate to design a fluent hierarchy of spaces ranging from public to private with intermediate zones of semi-private and semi-public.

Underlining the importance of “design, layout and everyday use of social space,” Lawton (2013) questions the degree of mixing among different social groups. According to the study, urban practitioners interviewed in Lawton’s study argue that social mixing –particularly of social-economic and ethnic groups– is desirable in street or neighbourhood scale, but not in individual blocks. Thus, the author calls for attention to the scale of social mixing, and the design of private and public urban social space.

3. Methodology

This study made use of semi-structured and open-ended interviews with officers from the Municipality of Copenhagen, HAs, and architectural consultants involved in the partnerships;

⁴ Random placement of individual housing units of a certain tenure group within an enclave of other type of tenure.

and collected written and illustrated materials from the interviewees or web sources. The initial interviews were conducted with officers in charge of social housing in the technical and environment department of the municipality. A limited snowball approach was adopted to select potential interviewees in order to expand the data set of the study. Upon advice of municipal officers, key persons from the HAs were contacted. Three key persons from the HAs, KAB, Domea, and fsb, representing respectively GBYH, BOFA, and ASBB were interviewed. For the third project, a supplementary interview was conducted with creative director of the consultant architectural company.

Interviews with the municipal officers focused more on current problems, potentials, and demands in the Danish housing market; the municipal approach to changing demand and demography of the society and its reflection on local decisions – quotas for small or affordable housing in development areas; social housing market, current projects, and their search for novel solutions to deal with emerging changes in the social structure. They shared some documents – including the invitation letter which set the scene for the partnership project – and contact information of some actors involved. Other documents describing the project models were collected either from the interviewees or web and examined in-depth. Altogether data covers information on the models describing architectural concepts, technical solutions, urban approaches, spatial response to diversity and mix, eco-

conomic benefits, and innovative aspects.

Further interviews were conducted to learn more about commonalities and differentiating properties of the projects. Therefore, common questions for each project were initially asked to the people representing the partnerships, to discover current status of the projects; their plans towards implementation; the development phases of models. Then, specific details were asked to build on the information in the previous documentary analysis, and thus, to elaborate the level of comprehension about each project and the different approaches to common issues and potential problems.

Based on the information collected; the current study makes use of the conceptual framework provided by a literature review on architectural and urban aspects of diversity, social mix, and social mixing. The projects are compared according to their visions for the concepts; the unique properties of each project; contextual adaptation; alternatives for expression for individual buildings to be constructed; architectonics of apartments; flexibility of use; options for accessibility; and other specific spatial decisions.

4. The models

The three conceptual models are briefly introduced below by describing their individual characteristics, approaches for mix and mixing, and spatial solutions developed to address their pre-defined concerns about residents, residences, and the nearby urban environment⁵.

Table 1. List of interviewees.

Respondents	Organization	Project	Title	Role
R1	Municipality (Københavns Kommune)		Architect, Technical and Environmental Department	Responsible of social housing
R2	Municipality (Københavns Kommune)		Architect, Technical and Environmental Department	Project leader
R3	KAB	GBYH	Social scientist, City and housing development department	Team chief, Special consultant
R4	Domea	BOFA	Project manager, Construction department	Project leader
R5	Rubow Arkitekter (Architectural Consultant to the partnership)	ASBB	Architect, Partner	Creative Director
R6	Fsb	ASBB	Architect	Building and Construction Chief

⁵ The findings disclosed in this section are based on the information in the web-based documents (fsb, Lejerbo, AAB, 2015; Domea, 2016; KAB, SAB, AKB, B3B, 2016) consisted of detailed definitions, suggestions, visual images, and technical drawings; and interviews with representatives of partnerships as mentioned in detail in the methodology section.

4.1. Generationernes byhus (urban house of the generations) [GBYH] – “Neighbourhood for generations”

GBYH is developed by the associations, KAB -the initiator-, SAB, AKB, and B3B. In 2015, when KK invited HAs to develop projects, the companies had already been working in collaboration for the new concept. KAB had already experienced some other projects developed to meet the increasing demand for affordable and sound urban housing for families (*Almene Bolig+*) and young people (*Basis Bolig*).

GBYH is basically presented by a sectional view of an apartment block, which illustrates an urban housing model for households from different generations to live together (Figure 5). The young, the elderly, and families with children are main target groups of the model which seeks to build up a close neighbourhood and a community life. Co-working of residents for maintenance and operation is assumed to create a basis for shared economy, reducing expenses and providing an active everyday life among neighbours. Moreover, the model aims to provide a close contact with rest of the city and contribute to nearby urban environment by defining semi-public and public spaces, like shops or community rooms, in the ground floor.

The model suggests a horizontal layering of blocks, thus, a strict separation of communal functions and floors of housing for each different generation group. The idea behind allocation of “public micro-shops” or other communal activities at the ground floor, not at top-floors or in backyards, is explained by prioritization of a liveable immediate urban environment. The claim is that a constant occurrence of public activity within a place increases the feeling of security and place attachment and pre-eliminate negative effects of empty or worn-out shops. It is argued that this also increases chance to interact with other neighbours, as everyone meets in the ground floor and becomes acquainted to each other. It is noted that due to individual conditions of a site and size of ground floor, apartments with private gardens may also be planned. Alternatively, a semi-

private location for the residents of the apartments is offered on the roof where a green space is designated for being together or relaxation.

By designating different horizontal layers for groups of different generations, the model is claimed to introduce a controlled privacy for each group. According to HA responsible, this choice is based on their experience that people tend to see similar lifestyles in their immediate private environment and are less tolerant for dissimilarities in close vicinity. Furthermore, there is also a set of principles embraced when determining the levels where each group of generation will live. Firstly, the top-most level has been reserved for the elderly people. Due to their weak attachment to the labour market or being in a relatively stable phase of their lives, they stay longer than the rest of the resident groups, and consequently, their share in turnover rates is the smallest, as “the most loyal customers.” Therefore, according to HA responsible, they deserve the most attractive location in the block with the best view being also away from noise and receiving more daylight. For her, noting that this group consists of people over the age of 50 who are still capable of looking after themselves; and elevators, strict maintenance under the responsibility of HA, eliminate potential problem of accessibility to upper floors. Secondly, in contrast to the older generations, the young residents –mostly students and young age professionals living alone or as couples– stay for shorter periods than others in the apartments. Moreover, they spend less hours indoors. Thus, they do not necessarily demand dwellings of best quality or with widest view. Indeed, living close to the entrance at the ground level is both more practical for them, as they go in and out more frequently than other groups; and thus, even more desirable for the rest of residents for minimizing disturbance and noise. Thirdly, families with children have less place attachment than the elderly as their possibility to move in and out is higher due to their work or children’s education. However, they are more connected to their homes

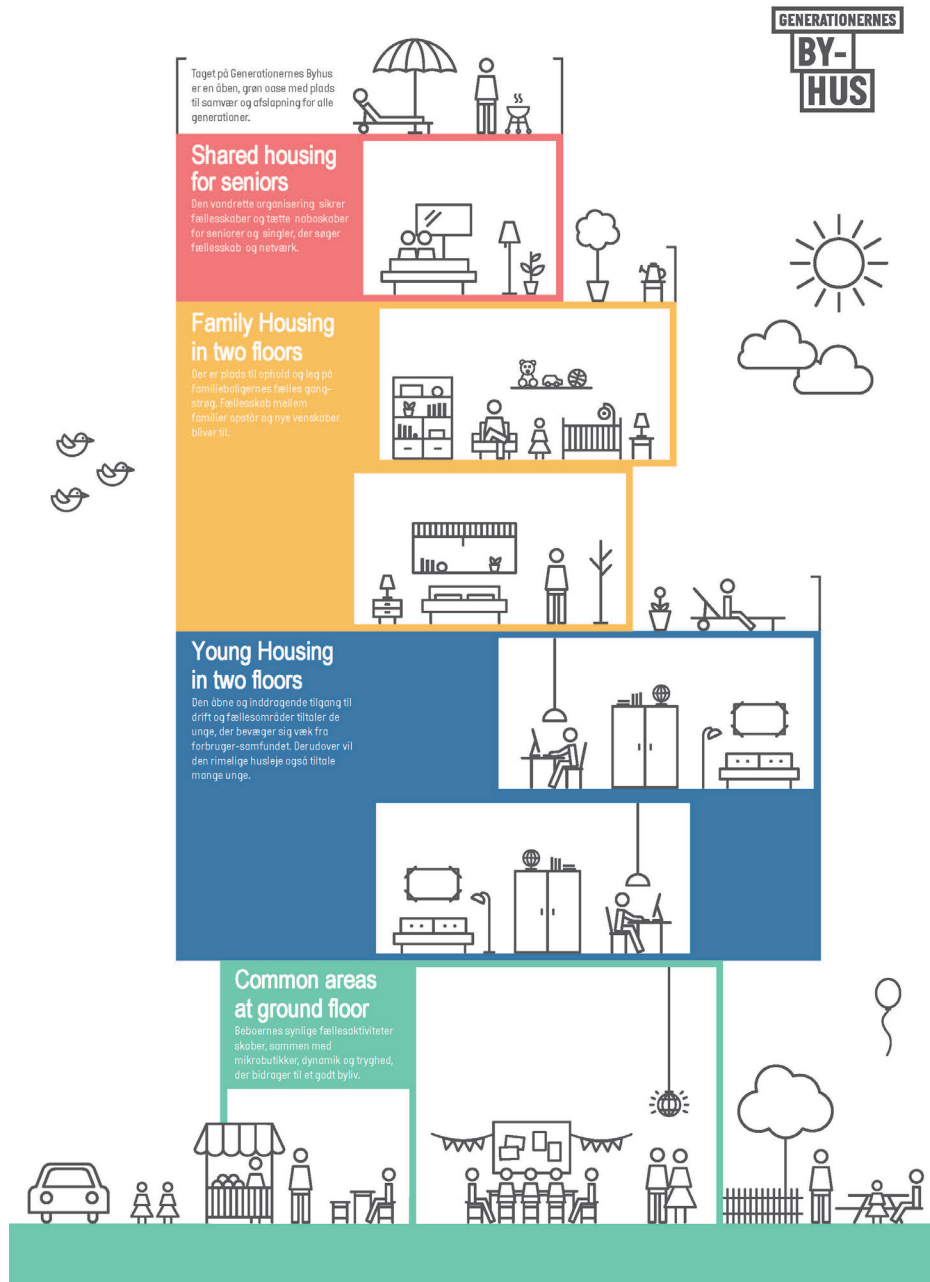


Figure 5. GBYH – The conceptual section (Source: KAB, SAB, AKB, B3B, 2016).

than the young residents, as they spend more time indoors to look after small children, to spare money and time by cooking and eating at home, and further, they usually cannot tolerate longer hours outside with children.

The model suggests families with children share not only the same level but also common terraces. The terraces are considered as semi-public places, where one shares certain common things with “people passing across your windows” and could leave their children play with others’ right in front of their doors. The common rooftop terraces

stand on a later stage of private-public hierarchy, where one meets with residents of same building from other generations. In any case, ground floor is the most public space where everyone has more chance to run into each other and interact as sharing the entrance or mailboxes provides the opportunity to meet on daily basis. In line with this, the HA responsible argue that elevator “kills the social life” and stairs are better as they increase further chance to interact with others. Similar idea also underpins the preference of terraces as they encourage more interaction.

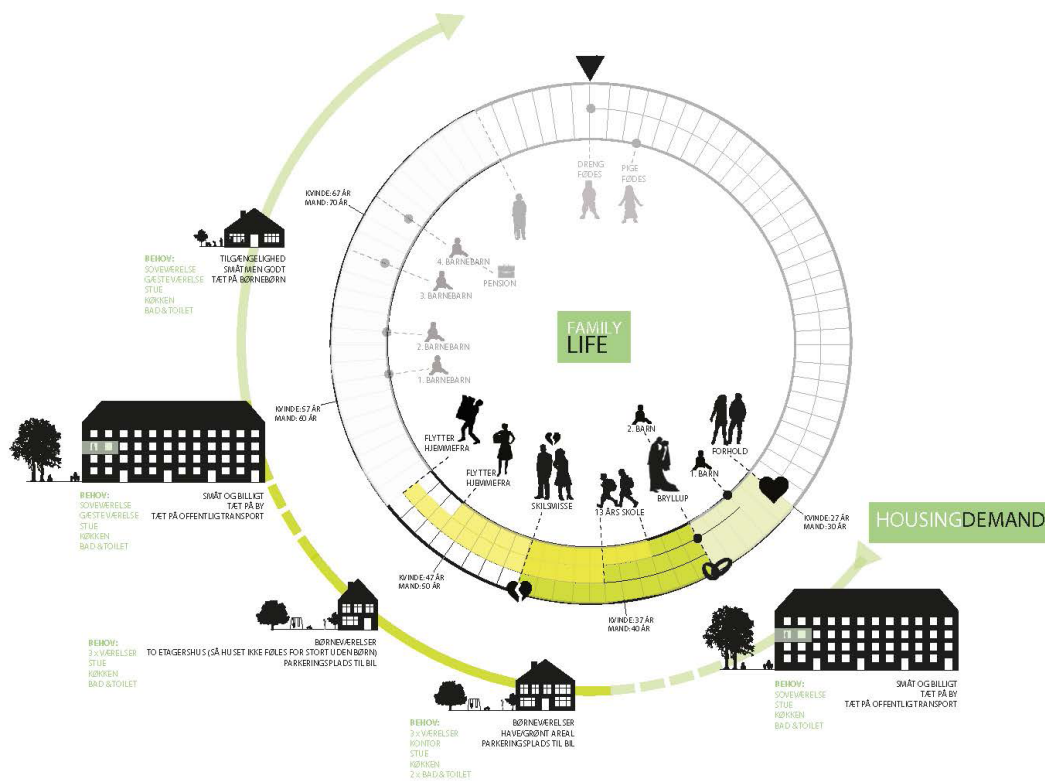


Figure 6. BOFA – Conceptual sketch of housing career of a hypothetical household in Copenhagen (Source: Domea, 2016).

4.2. Boliger for alle (Houses for all) [BOFA] – “Opportunity of transition across ownership types”

BOFA was developed by housing association Domea; construction company FB Gruppen; lawyers’ company NT Advokater; and engineering and design consultant company Rambøll. Domea is a relatively smaller company than KAB; but serves for 100 housing associations -42.000 social housing units.

The BOFA model is founded on four fundamental piers. First, it embraces a ‘value-based’ program, achieving

a high architectural value with optimum utilization of housing interiors and relative placement of dwellings. Secondly, the model centralizes effective handling of construction by use of a common system giving possibility of flexible arrangement of houses to shorten the duration of constructions with economic solutions of quality. Thirdly, the model defines a service concept optimizing operation with digitalized tools and involvement of residents in care of common spaces. Lastly, it offers mixed forms of ownership which is the unique property that makes the model different from the other two. Accordingly, the aim is to facilitate social, shared, owner, private rental housing options together to increase diversity and to activate neighbourhood by providing shared activities and common service functions.

Targets set to contribute to development of a large urban area and to secure a diverse composition of residents, the model offers a wide range of housing supply with varying sizes, location, and ownership, as living patterns in Copenhagen change and housing careers of citizens diverge significantly (Figure 6),

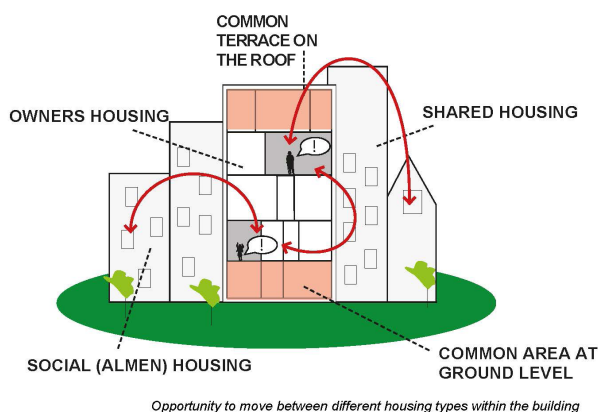


Figure 7. BOFA - Conceptual sketch of mixed ownerships (Source: Domea, 2016).

Although the managerial framework for such mixed ownership has not been drawn yet, an umbrella organization to work across all forms of ownership is planned to be founded in order to finance and organize the operation of buildings and common areas (Figure 7). A 'dynamic waiting list' is argued to provide a further flexibility for residents which will create an opportunity to choose across different tenures and types in line with the phase of life he is in, his need, economy, or taste.

It is disclosed that apparent physical differentiation across different forms of ownerships will be avoided by applying a common language of outer volume, materials, entrance principles, plan solutions, technical solutions across all. This is a precaution against visual stigmatization. However, as each form of ownership requires different rules of finance and economy, the model requires physical compartmentalisation of different tenures. Accordingly, different staircases for different tenures within same apartment block will be designated. (Figure 8)

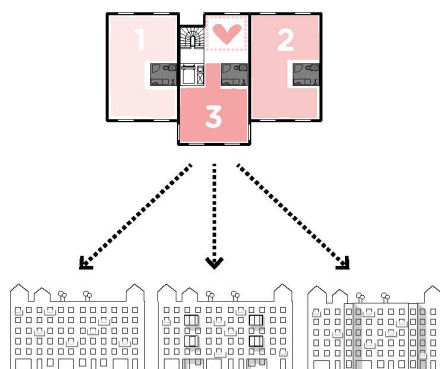
BOFA requires architecture of housing blocks to be in harmony with individual contextual properties

of nearby urban environment. Therefore, integration to physical (typology, scale, material, infrastructure, edge zones, special ground conditions) and functional (centrality, existing housing supply, possibility and demand for trade, café, shopping, public offers) contexts is defined as a critical priority. It is argued that such adaptation will also provide each building with its own identity. (Figure 9)

Building concept is highly elaborated to maximize alternatives for a varied residents' composition. Basically, a simple but flexible housing plan with a flowing space is embraced. Carefully defined depth of apartment modules –7.2m to 10.8m– gives the possibility to mirror the plan and arrange kitchen and living room according to the desired orientation. Possibilities of interior arrangements are maximized by placing the entrance and corridors minimum 4 meters from each side and the wet core in the middle. Common traits of standard module are fixed toilets, staircase, entrance to balconies, and two shafts installed for bathroom and kitchen. The interior is arranged according to a detailed light analysis. Rhythm of windows in each apart-

1. BASIC LAYOUT

A simple but flexible housing plan, which can create a variety of houses. Normal floors between ground and roof levels.



2. GROUND FLOORS

Ground floors are flexible and open for adaptation to individual contexts. It means that different communities, special housing types and connections to the surrounding city can be created.

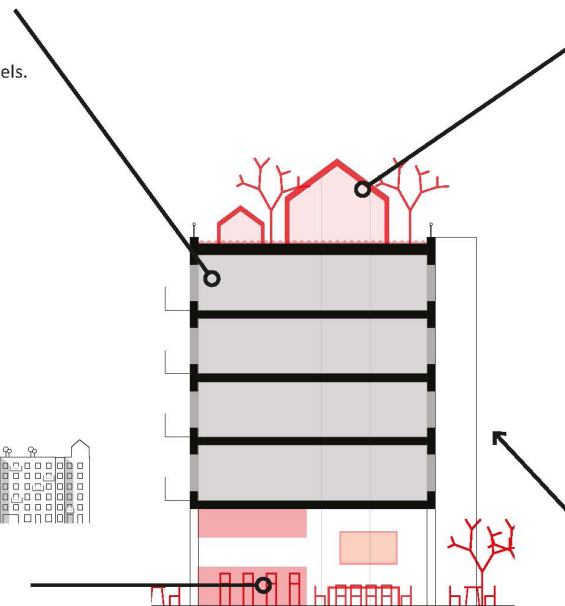


Figure 8. BOFA - Basics of apartments, floors, and blocks (Source: Domea, 2016).

ment are designed to make it possible to establish small rooms and kitchen on both sides. Primary architectural layouts consist of three basic modules: 'basic module', 'basic module +', and 'corner module'. The modules are designed to provide possibilities for different contextual arrangements of building blocks – linear horizontally; curved; city square; and row houses.

Outside the apartments, staircase cores are placed on façade claiming to maximize natural lighting and to arrange entrances of three apartments in the same floor. Houses in the middle are shifted further out of façade to get light from two sides. Additionally, there is extra space on each floor for alternative spatial arrangements to be used as activity rooms; hotel room for guests; teenage room; or office. Outer expression of buildings is stated to be differentiated either by different use of materials, or arrangement of smaller apartments in the middle with different rhythms.

Rooftop areas are used for common living, roof gardens, greenhouses, or special housing types. Flexible arrangement is adopted to create special environment and visual profile, green initiatives, untraditional housing (shared housing, study housing) or offices. Small shared or private terraces;

medium-sized terraces (fruit gardens, kitchen gardens with herbs and vegetables); large terraces (greenhouse, playgrounds) are suggested for alternative functional use of the rooftops.

Like GBYH, ground floors are designated for flexibility and contextual adaptability. Therefore, common living facilities; urban passages and connections to city; workshops; trade, café, kindergartens; and special housing types (row houses, studio, penthouse) can be arranged. Small or untraditional housing, shared living opportunities, study houses, row housing or houses with double height space; day-care institutions are also mentioned among alternative opportunities for the ground floor. Additionally, three basic landscaping concepts of different sizes are defined and aimed to serve for public or private functions.

According to HA responsible, the law on social housing in Denmark demands several restrictions. Therefore, making such detailed architectural decisions described in the model is a means to maximize the living space by staying within the boundaries of law, to pre-eliminate loss of time for developing new principles in each project, and thus, to create an appropriate set of long-term principles avoiding popular approaches, but instead, presenting alternative means for flexible architectural expressions outside the buildings.

Currently, Domea has four contracts with different total consultant companies who are currently looking for sites to construct the model on. The HA will choose the best business case(s) among alternatives.

4.3. Almene storbyboliger (Common large urban houses) [ASBB] - "Urban, small, and smart"

ASBB project is developed by three large housing associations, Lejerbo, AAB, and fsb. The HAs started to get architectural consultancy of Rubow Arkitekter, experienced in many social housing projects, to develop a housing concept for modern needs in 2014, before KK's invitation for a cooperation.

The basic concept of ASBB is briefly described by a motto, 'small and smart urban houses.' The idea has been developed in response to demand from

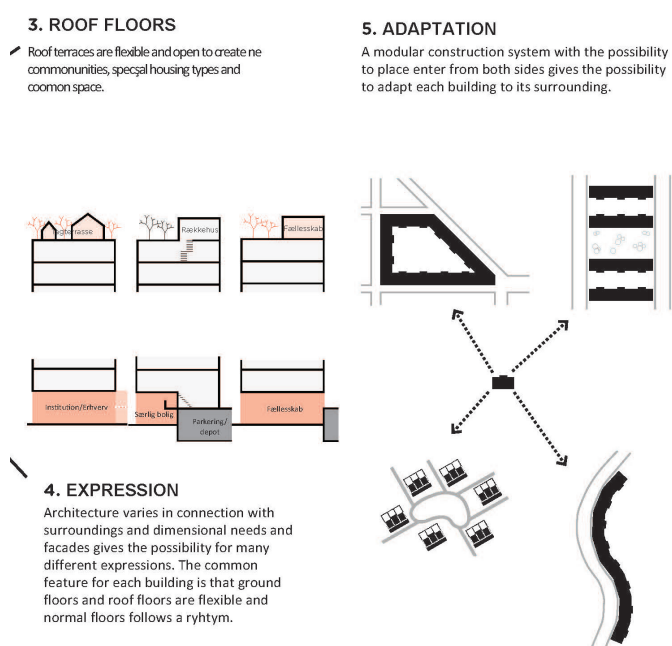


Figure 9. BOFA - Basics of architectural variety inside and outside (Source: Domea, 2016).

residents (with “normal” incomes but of dissimilar household combinations) for cheap and small housing. Accordingly, ASBB suggests a flexible building structure consisting of spacious and transformable co-living units; an active neighbourhood with alternative communal functions; and a continuous interaction with the surrounding urban tissue. It is noted that the model gets use of edge zones –the sides of building particularly at the ground floor– to support city life. (Figure 10-11) Addressing particularly the needs of urban modern people – the young, families, senior couples; and singles, divorced, divided families, newcomers, students, co-habitants – ASBB offers small-sized apartments with flexible use of interiors, multiple types of common areas, payable rents, apparent architectural quality, and positive identity.

The model has been architecturally elaborated. To start with, housing modules are designed to have an orthogonal flexibility with a functional layout, so that, they can be extended both vertically and horizontally if needed (Figure 12-13). Aligning longer edge of apartment modules parallel to the facades reduces house depth and maximizes daylight inside. Furthermore, large windows provide enhanced visual contact with sky, garden, and the street life. Each module is organized around a “smart zone” which includes bath, toilet, entrance, kitchen, installations, and other technical functions. Located on the darkest side of the dwelling units and optimized for handicapped residents, the “smart zones”, also functions as a buffer zone against sound from building entrance and corridors. It also provides 2-3 small niches for flexible functions, such as shelves, bookcases, and wardrobes, which can be closed with sliding doors and wickets. Depending on housing size, foldable beds, walk-in closets, luggage rooms, workspaces, foldable kitchens, or guest beds can be arranged. Criticism of whether such detailed architectural guidance limits future design possibilities or not is rejected by the head architectural consultant (R5). On the contrary, R5 claims that the model provides a large freedom of interior arrangement of housing units,

common spaces, and vertical circulations cores by utilizing the modular system for construction; and of exterior or architectural expression by freeing the façade from structural elements.

The building concept abandons traditional balconies not only for the sake of economizing, but to encourage the residents to socialize more in shared spaces within the building and outside, in the near urban environment. Alternatively, it offers meeting spaces in the form of shared floor ter-

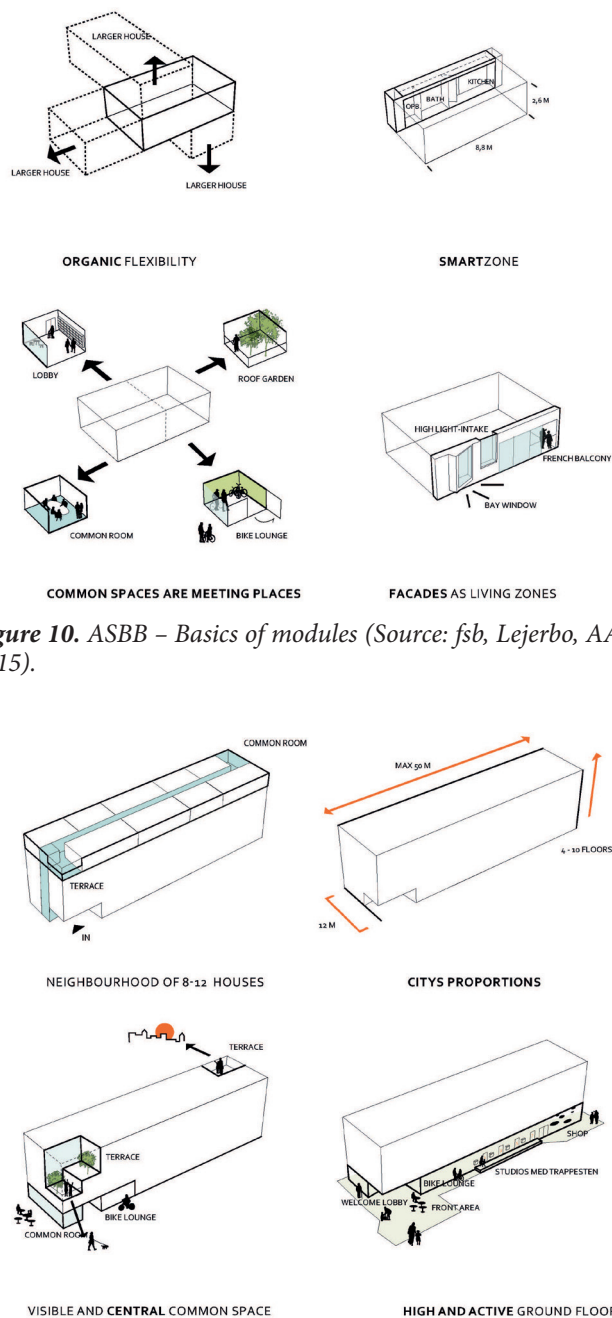


Figure 10. ASBB – Basics of modules (Source: fsb, Lejerbo, AAB, 2015).

Figure 11. ASBB – Basics of housing block (Source: fsb, Lejerbo, AAB, 2015).

paces, arriving lounges, bike lounges, clothes-drying rooms, birthday rooms, post walls, climate zones, greenhouses, hardware wardrobes or common activity centres. R5 claims that this is not a sacrifice but a contribution to common living, thus, the conceptual design was shaped by minimization of private spaces but inclusion of common semi-private or public spaces.

The model consists of ‘building bricks’ which form different housing types addressing a large spectrum of

residents, also with alternative solutions ‘atelier housing’, ‘large and light family housing’, and ‘studios with extra floor height.’ Different combinations can be made to match demand of local plans, context, and solar orientation. A ‘3D tetris-like’ smart modular system provides space for 8-12 apartments for families, the young, and elderly on the same floor. (Figure 12) In addition, the system claims to secure the future of building by creating flexibility of establishing new housing types during construction or over time. The apartments on a floor are arranged around a common entrance and circulation corridor. The head architect claims that such corridors use as much circulation space as existing social housing blocks in the city. They eliminate the need for artificial lighting by skylights or carefully placing modules of common functions along the corridor to catch and transfer sunlight towards inside. Thus, main stairs can be placed on the façade and serve as a place of interaction.

The concept can be applied for a variety of volumetric options in different urban bodies: horizontal blocks, urban squares, towers, point house or in-fills. Proportions of the blocks have been developed by taking the primary physical and urban qualities of the capital city grid, ‘Urban Square – *Karré*,’ into consideration. Façades cleared of load-bearing elements are claimed to create freedom of options to design according to distance to neighbours, local wind conditions, noise and shadow conditions, and targeted inner climate levels. Moreover, they can be re-established in case of a future need of transformation; new types of housing demand; change of architectural streams and esthetical norms; or development of new cladding materials. Furthermore, corners of square or L-shaped buildings are designated for arrangement of main staircases, common areas/terraces, large atelier houses, or tower blocks. Following the concept, roofs are considered as a ‘fifth façade’ for example, atelier housing where larger windows can be optionally demanded. R5 states that public roof terraces are avoided on purpose, as she claims that people living in a dense city

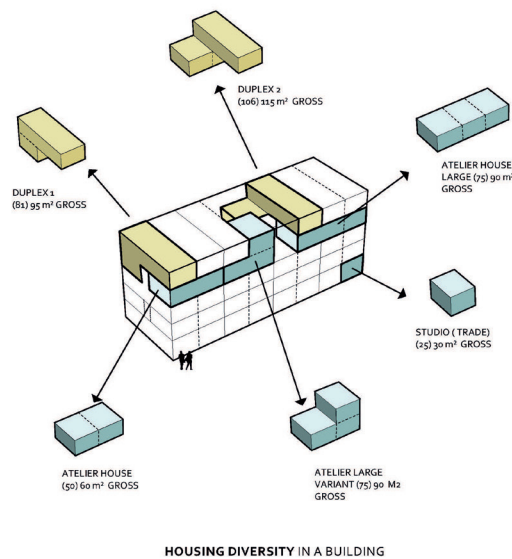


Figure 12. ASBB – Alternative volumes for different dwelling types (Source: fsb, Lejerbo, AAB, 2015).

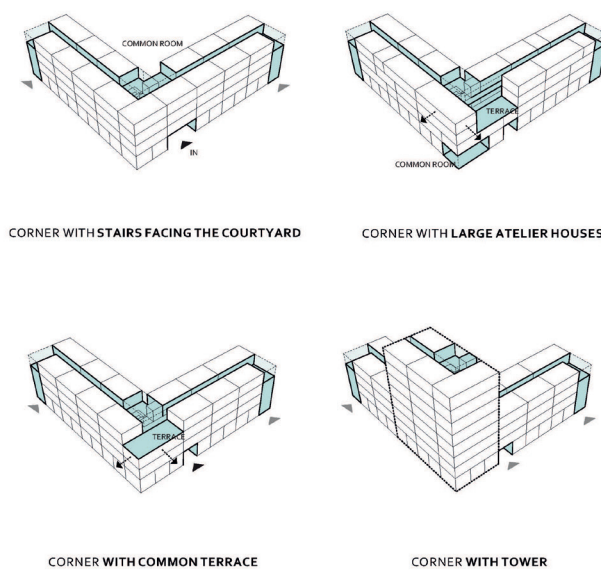


Figure 13. ASBB – Alternative volumes for different urban contexts (Source: fsb, Lejerbo, AAB, 2015).

area tend to “hangout on the street, use beach front, use playground,” and their experience shows that such terraces are not preferred, for instance, in Ørestad. Furthermore, extra height in the ground floor can be utilized for alternative functional and spatial needs, such as, lobby, bike park, storage, rental shops, offices, studios with 1,5 floor height. Consequently, combination of varying volumes, material, roof form, façade, organization of common spaces contribute to addressing contextual properties and creates harmony within. Arrangements for accessibility and openness for dissimilarity; a set of functional options for all kinds of households and active common living displays an awareness and care for a socially sustainable environment.

ASBB project has been on a standby, as it suggests a smaller average area of social dwelling units than current local plan regulations ask for.

5. Discussion

This study problematized how recently discussed social mix goals to address increasing diversity in Copenhagen reflect on architectural and urban design practices. Therefore, three novel social housing concepts developed to meet the emerging

needs of rising and diverging urban household population in the Danish Capital have been examined. In doing so, preliminary and final documents illustrating the models by the housing associations were studied in-depth. Interviews were conducted to understand development processes of the projects, to question implicit reasons behind spatial arrangements, to cover missing information, and to have a comparable set of information. As the projects have not been realized yet in form of buildings, no physical observation or satisfaction analysis could be made. The previous section disclosed the main results of this research process introducing the concerns and suggestions of each project. Here a comparative discussion is provided to extend the conception a step further. (Table 2)

Among the three projects, GBYH is the one which articulated its architectural framework least. It was an intentional decision to emancipate contractors and their architects to develop context-based practical solutions in later stages. In contrast, BOFA and ASBB draw more definite outlines particularly for layouts of apartments and blocks, although the representatives of both projects argue

Table 2. A chart for comparison of the projects.

Project	GBYH - <i>Generationernes Byhus</i> Urban House of the Generations	BOFA - <i>Boliger for Alle</i> Houses for all	ASBB - <i>Almene Storbyboliger</i> Common Large Urban Houses
Partners	KAB, SAB, AKB, B3B	Domea, FB Gruppen, NT Advokater	Lejerbo, fsb, AAB
Architect	Architects to be defined after tender process	Ramboll	Rubow Arkitekter
Motto	“Neighbourhood for generations”	“Opportunity of transition across ownership types”	“Urban, Small, and Smart”
Vision on Social mix/ Social mixing	<ul style="list-style-type: none"> Mixed ownership (not clear yet) Generations share same block Hierarchy of private/public zones 	<ul style="list-style-type: none"> Mix in neighbourhood and block scales Separate entrance/ staircase within blocks for different ownerships Partition within unique blocks for all ownership types 	<ul style="list-style-type: none"> Social mix of modern urban residents within same block Maximized social mixing No individual balconies, more common terraces No rooftop public terraces to encourage urban life outside
Unique property	<ul style="list-style-type: none"> Shared activities at the ground floor Vertical installation - Large volume Strict horizontal layering for generations and activities: (Ground) common area / shops-small trade; (1-2) youth dwellings; (3-4) family dwellings; (Roof) common area. 	<ul style="list-style-type: none"> Mixed ownership Common waiting lists across ownership models An umbrella association to operate them all Care for housing careers – flexibility for different household combinations Balconies for all apartments 	<ul style="list-style-type: none"> ‘Smart zones’ in apartments <i>Atelierbolig</i> typology: flexible studios with few or no walls Edge zones to support city life Flexible structure to connect housing modules Horizontal arrangement of units for maximum daylight
Contextual adaptation		<ul style="list-style-type: none"> Adjustment/ harmony: contextual adaptation for housing blocks by modular construction system Different dwelling modules for different arrangements 	<ul style="list-style-type: none"> Number and types of apartments to be decided according to municipal demand or local building context Flexible typologies: in-fill/ tower/ square block 1.5 storey height at the ground floor for public functions
Flexibility for expression		Architectural variety provided by flexible floorplans; Different façade options; alternative spatial organizations for ground floors and rooftops	<ul style="list-style-type: none"> Flexible corners of building blocks to place staircase, large atelier dwelling, common terrace, tower block Flexible options for façades
Apartment		<ul style="list-style-type: none"> A simple but flexible dwelling unit plan ‘Flowing space’ plan for dwellings Fixed space for toilets, stairs, and shafts 	<ul style="list-style-type: none"> Dwelling units adaptable like LEGO-bricks to serve for different households in building’s lifetime Double storey alternatives for apartments Detailed/Elaborated interior design
Physical diversity		<ul style="list-style-type: none"> Flexible rooftops: house, common facility, terrace. Flexible functions for contextuality at ground floors. 	<ul style="list-style-type: none"> Diversity through flexible house-bricks. Flexible building structure
Operation / Maintenance	Residents’ collaboration	<ul style="list-style-type: none"> Residents’ involvement for maintenance common spaces. Digitalized tools 	
Environment/ Sustainability			<ul style="list-style-type: none"> Holistic housing concept: sustainability of all aspects: Passive design features; clever use of building orientation; blue backyards; daylight-oriented design within apartments The Smart Square / <i>Den Kloge Karre</i> for climate design
Accessibility	Elevators for elderly	Details for the handicapped: physical obstacles are avoided; sensitive dimensioning of critical spatial elements.	Details tailored for the handicapped: avoiding physical obstacles; careful dimensioning
Current State (2018)		4 contracts with consultants. The HA seeks for plots and will develop business models.	Not applicable within existing local plans. At standby for an unpredictable duration.

that they create a customizable interior arrangement and allow freedom of expression to harmonize with many contextual variables. That, as they argue, is an intentional decision to eliminate extra time and resources to be devoted to find solutions for the highly specific regulations of the social housing market, each time a project is initiated.

All three models allow different generations to live in the same block, though GBYH suggests a strict vertical layering of housing groups for each generation. GBYH's proposal centralizes demands and lifestyles of households groups and seeks for avoiding potential conflicts by pre-defining characteristics of neighbours a resident will come across in his/her immediate environment, and thus, be regularly in direct contact with. Whereas the other two projects do not define such definite rules, instead, they basically encourage living with and learning from others. Interviewees contacted for both projects also acknowledge that specific decisions may be taken on a case basis due to local context and demand.

The macro design decision to offer a mixed ownership structure in BOFA requires some further concerns to be noted. Not only potential legal frictions, but also conflicts among residents of different tenure groups are to be dealt with. Although the legal structure has not been outlined yet, developers of BOFA are aware that the model should avoid stigma as Tiesdell (2004) and Roberts (2007) highlighted. Thus, use of similar outer expression across all different tenures is prioritized. Revealing an awareness of scale of social mix (Roberts, 2007; Lawton, 2013), they also designate separate entrances in separate blocks for different tenure groups as a macro design feature (Tiesdell, 2004) to serve for practical reasons, such as maintenance.

Furthermore, BOFA is the model which strictly addresses potential changes in one's housing career, among others. Its embracement of mixed ownership and suggestion of a "flexible waiting list" and "micro design" features (Tiesdell, 2004) –extra spaces left in each floor for future needs, like a teenage room for growing kids, a guest

room for unexpected long-time visitors, or an office to establish a home-office business– provide organizational and spatial tools to meet the evolving needs, and concretely reflect such awareness.

The careful placement of vertical shafts and toilets in BOFA and designation of "smart zones" in ASBB provides the two models with a flexibility of architecture for future transformations, as elaborated by Mortensen (2018). Moreover, the later one also provides a distinct building structure which makes connection or disconnection of two or more vertical or horizontal units to provide alternative layouts. Reserving the darkest edge of rooms and leaving the rest of the room as a free space, the "smart zones" of ASBB are re-organisable, and therefore, advantageous for physical flexibility to address future changes in the mix of residents.

On the other hand, architectonic consideration to enhance accessibility increases capacity of inclusion of a given space, as Mortensen (2018) exemplified, and provides a universal basis to be utilized by all groups –elderly, handicapped, children etc. BOFA and ASBB apparently disclose their concern for accessibility, particularly within apartments. Both models explicitly put guidelines for the handicapped –such as avoiding physical obstacles or careful dimensioning for potential use of wheelchairs. However, despite avoiding a detailed architectural framework, GBYH's - allocation of elderly housing on the top-most floor can be criticized in this respect as people over certain age are more prone to fatigue or injuries; and even though they are healthy enough to conduct their daily routines, living on the top-most floor can create a handicap once they get ill. Thus, despite elevators are claimed to set disadvantage for social interaction, elimination of them sets potential problems of accessibility.

Lastly, all three models have concerns for social mixing both among residents living in the housing blocks and between them; and other urban citizens in the neighbourhood. GBYH introduces a "hierarchy of semi-private and public spaces" (Arthurson, 2010) which can be utilized for different

expectations of privacy. Likewise, BOFA foresees common areas within the model; however, it does not suggest a fixed layout. In contrast to them, ASBB suggest common spaces which are designated as an alternative to private balconies. Prioritizing urban interaction and its design echoing Lawton's (2013) argument on the relation between urban public space and social mixing, ASBB elaborates its concern for ground floor and edge zones to encourage interaction with the urban life in the vicinity; but avoids public roof-top terraces claiming that they set encourage a semi-privacy. Instead, it suggests ground floors with a 1,5-floor height to establish public functions, cafes, or businesses; thus, to invite others to the vicinity. Freeing of the facades from structural elements contributes to such purposes by enabling alternative designs for different functions.

6. Conclusion

The projects have the potential to provide central neighbourhoods of Copenhagen, which predominantly consist of privately owned or private rental residences, with a mixed tenure, as all three of them fundamentally based on rental schemes. Although this does not necessarily guarantee a balanced mix of income groups, it helps to create cheaper options for those who cannot afford higher rents or prices. Indeed, centrally located social housing in Copenhagen is not rented for low price. Nevertheless, according to the law, the municipality has the right to provide priority for allocation of up to 20 percent of social housing units to those who are socially or economically vulnerable. Therefore, due to a combination of these reasons, urban social housing is a potential tool to serve for a portion of the society and to address social mix of income groups, despite risking inclusion of citizens of the lowest income level.

As social housing is under public control in Denmark and there is direct involvement of local municipalities, public authorities have the right to control the production process, are involved in decision-making, and demand certain principles for building.

It can be argued that such institutional dynamics set favourable conditions for architectural experimentation when new solutions are requested by the authorities. Combined with the general adoption of high standards of quality for architecture both by private and public investments in the country, the examined partnership projects for innovative social housing development have become an opportunity to elevate the mean value of the architecture for ordinary citizens and to contribute to the solution of problems of the contemporary housing market. Furthermore, attentive design creates extra value for a harmonious social mix without extra cost.

Consequently, the partnership projects provided a platform for a large-scale brainstorming which gathered lessons from previous experiences of many housing associations, professionals, and local decision-makers. The projects have also encouraged innovative solutions to deal with contemporary problems in the growing urban residential market. Besides, although all the three projects present ideas for the unique context of Copenhagen, the problems are also subject to global debate; such as, demographic change, social mix, affordable housing, flexible design, liveability and sustainability. Thus, even though none of the projects have been constructed yet, the ambitious concepts proposed deserve critical attention to raise global awareness for diversity of cities, households, and their rising needs.

Acknowledgements:

The author thanks Prof. Claus Bech-Danielsen of Danish Building Research Institute (SBI) for his invaluable guidance during the research study.

The author would also like to thank the interviewees, the editors of the journal and the anonymous referees who helped to improve the paper. The author conducted the research work for the current paper at Danish Building Research Institute (SBI) of Aalborg University in Copenhagen, Denmark, where he worked as a guest researcher for his post-doctoral study between 2017-2018. He would like to thank SBI

and Prof. Claus Bech-Danielsen for his invaluable guidance during the research work as a supervisor. The author would also like to express his gratitude to the interviewees, the editors of the journal, and the anonymous referees who helped to improve the paper.

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