OPEN ARCHITECTURE: A FRAMEWORK FOR USER-INVOLVEMENT

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ABSTRACT

This paper offers a framework for the categorization of user-involvement in the realization of dwellings. An engaged role of users within the design and build process holds the potential to overcome the current difficulties the built environment is experiencing to meet the needs of users. Due to current ambiguity of the concept of user-involvement architects often chose inappropriate methods and involve users at their convenience in practice. Open building principles support users in getting involved within the realization of dwellings, however, it generally requires considerable effort. Increasing the transformation capacity of dwellings can lower the barriers for current and future users to take up an engaged role. The framework presents a way of thinking about and setting out the different aspects of user-involvement. The framework allows for comparing cases based on specific characteristics of user-involvement. Secondly, the framework can be applied in order to support architects in making conscious decision with regards to what phase, what domains and to what extent users should be involved within the realization or transformation of dwellings in order to reflect their needs and wants.

KEYWORDS: *Open architecture, transformation, user-involvement, Design for Disassembly, adaptability*

I. INTRODUCTION

Due to urbanization and population growth (CBS, 2018), the housing demand within the biggest cities in the Netherlands is rising. In order to meet the housing demand, these cities have taken up strategies of both expanding as well as densifying.

The population growth within the Netherlands, as well as in many other countries in the European Union, is mainly due to migration (CBS, 2018). There is a close connection between migration and urbanization (IOM, 2015). As a result, cities in the Netherlands are becoming increasingly socio-cultural diverse. Also, history provides us with evidence diversity is something dynamic. Migration is a structural element of Dutch history (Lucassen et al., 2013). Historically cities worldwide have played a major role in the process of integrating newcomers into society (Hirst, 2005). Simultaneously cities - including Amsterdam- have been shaped by migration. Conditions in which many migrants arrive however, often do not offer the same flexibility (Judah,2018).

Due to the large scale postwar planning, the building stock is largely made up out of apartments: there is a lack of diversity within the built environment. The floorplans are composed of similar diagrams which lead to mono-functionality. Over time these neighborhoods have become inhabited by low-income households, including vulnerable groups migrants. Many of the accusations made against the failures of the mass-housing schemes after World-war II are rooted within architects and urban planners taking up overly deterministic approaches (Groat & Wang, 2013).

Current strategies of the municipality to counteract the mono-functionality in deprived areas involves the development of middle- and high-range dwellings. The strategies of diversifying the building stock are still very much based on quantities: on the number of rooms, and the total amount of square meters. However, the meanings of dwelling and architectural taste aren't homogeneous neither universal. Guidelines or regulations for the design of 'good' dwellings do not address the issue beyond differences related to household composition (Overtoom, 2017). Little to no attention is given to

different needs and wants of ethnically diverse users within the built environment. As a result inclusion and diversity remain major challenges for the built environment.

In order for cities to remain vital and open, dwellings should be able to absorb or adapt, to reflect changing user requirements. An engaged role of users within the design and build process holds the potential to overcome the current difficulties the built environment is experiencing to meet the needs of users.

1.4. Thematic research question

Therefore, the overall research question of this paper is: *In what ways can a combination of open architecture principles and design strategies support current and future users in getting involved in the realization of their dwellings in order to reflect their needs and wants?*

The overall research question will be answered through several sub-questions:

What are the principles of open building?

What are the benefits of user-involvement in the realization of dwellings?

What are the characteristics of users-involvement in the realization of dwellings?

What are the goals of users involvement in the realization of dwellings?

How to categorize and compare user-involvement strategies in the realization of dwellings?

1.5. Method

This paper offers a framework for the categorization of user-involvement. Various case studies were conducted in order to explore the various strategies for user-involvement, particularly focused on dwellings in the Netherlands. The case studies were also intended to validate the de framework.

The overall research methodology is a combination of a literature review in two domains -design science and architectural design- and case studies. A literature review on the principles of 'open architecture' and a literature review on 'user-involvement' was conducted. Characteristics which are important for user-involvement in the realization of dwellings were explored. The literature review fed the research in several ways; 1) the goals of user-involvement 2) the supporting theory for the framework for the categorization of user-involvement.

The selected cases all involved a transformation of physical structure within the Netherlands. Within each case user were involved during the design, build phase or a combination of both. For two out of four cases the design of the structure was aimed at facilitating user-involvement within the process. Two other cases involved the transformation of existing buildings.

Next to the categorization, the required effort, skills and time were investigated. Within the case studies, the type of user, design intention and site were considered.

II. OPEN BUILDING

The concept of open building is not something new. In the 1960s various visionaries have promised openness, vitality and participation. Within this section, there will be elaborated on the concept of open-building, as proposed by Habraken. Secondly, the concept will be put in a contemporary perspective by using input of Design for Disassembly.

2.1. What are the principles of open building?

The *purpose* of the concept of open building is to facilitate change. It is aimed at the design of buildings which can absorb and reflect changes in its environment. Buildings are viewed as ongoing dynamic processes rather than fixed entities. The building becomes a system, supported by sub-systems.

In order to meet the needs of current and future users, the built environment has to facilitate change. The capacity of buildings to transform plays a major role to improve the sustainability of the building. The possibility of buildings to last through time while materials, components and spaces change, generates multiple opportunities. Including each of the pillars of sustainable development (Nakib, 2009):

Socially: It enables coherence with cultural and social tendencies whilst preserving the place identity and specificities. It allows for fulfilling the common and individual needs of people without compromising future generation.

Economically: The design of transformable buildings allows for efficient functioning of the building, it can change faster and at lowers costs. Secondly, it increases its exchange value (DeGory, 1998).

*Environmentally***:** Due to the current lack of flexibility within the building stock current strategies of adapting the built environment to meet changing user requirements often involve demolition. As a result, waste is generated. Due to the large pressure on natural resources, it is necessary to move forward design that optimizes the productivity of resources (Durmesivic. 2010).

2.2. Support and Infill: levels of change

Habraken investigated mass housing and strategies for the participation of users and residents within the process. He critiqued the post-war mass-housing strategies. In his book, *'de dragers en de mensen'* proposed an alternative, aimed at restoring the natural relationship between buildings and dwellers.

Habraken advocates an approach in which the state provides the physical infrastructure, the support. This support provides space for people to build their own houses. Architects and planners provide dwellers with a physical structure: the technical solution. The support has a literal and figurative meaning. Habraken addresses the *levels of change* within the built environment. Habraken advocates for a method that divides buildings into levels based on the responsibilities of its agents. These levels include the urban fabric, support, and infill. Within this hierarchy, the infill operates independently from the support system.

For Habraken, user-involvement is informal. However, it is supported by a system. He proposes order through life: the order is *dynamic*. At the same time, the structure defines the *'rules of the game'* (Habraken, 1998). Participation, therefore, is about handing individuals tools.

2.3. Design for Disassembly

Design for Disassembly, a method for the lifecycle design of buildings and building products, offers guidelines for the design of transformable buildings. An increased transformation capacity opens up possibilities for dwellers to influence the way the dwelling performs over time. Important elements of sustainable transformation are the *exchangeability* and *independency* of various elements within the building (Durmesevic, 2010).

Design for disassembly makes an 'acceleration of change' within the built environment possible. In contrast to the *levels of change* as proposed by Habraken, design for disassembly enables the functional levels and the material levels of buildings to become independent of each other. Therefore the durability of both the functional levels, as well as their material can be extended. Meaning that after a building is realized, it is still possible to influence the material, physical and functional levels.

2.4. Process transformable buildings

The design of transformable buildings requires a different approach. Transformable buildings, imposes different construction, operation and developing patterns (Durmesevic, 2010). It involves an iterative process rather than a hierarchal linear process.

The process of transformable buildings makes an iterative process with real usage data possible. To use the actual 'usage data' creates opportunities to propose design solutions according to the needs and

wants of users. Secondly, the usability of building is not a project but a continuing process (Alexander, 2006).

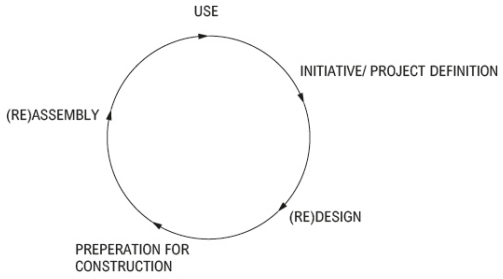

Figure 1. Process transformable buildings

III. USER-INVOLVEMENT

"Architecture is made by use and design. To use a building is to make it, either by physical transformation, such as moving walls or furniture or by inhabiting it in ways not previously imagined or by conceiving it anew." (Hill, 2001).

Jonathon Hill argues that users are always involved in the *'formulation of architecture*'. To Hill involvement equals *transformation*: either a transformation in meaning (mental) or a physical transformation. However, the way that users can be involved is largely determined by architects. Both the **building model** and **design strategies** of architects suggest a specific **role** for the user. Users can be passive, active or creative. In order to enable users to take up an engaged role, architects need to develop strategies which remain -*open*- to 'other ways of doing'.

User-involvement and related concepts such as *co-production* and *participation* currently have a certain ambiguity within the architecture practice. As a result, architects and planners often use inappropriate methods for user-involvement or use it at their convenience in practice (Kaulio, 1998). The following chapter elaborates on the concept of user involvement. Users can refer to stakeholders involved, including a client, facility managers, or in a broader sense such as the community in which the project is located (Sanders, 2008). Within this paper, users refer to current and future dwellers (end-users).

3.1 What is the current role of users within the process?

This section gives a brief introduction to the role of users within the development process of dwellings within the Netherlands: the current 'ways of doing'.

A traditional development process in the Netherlands is structured in hierarchal phases. The vast majority of projects are *top-down,* meaning that actions are being determined by developers, the state or third parties. Due to tender procedures design requirements are fixed early on in the process. Users get involved during the occupation phase. As a result, there is a gap between architects and users. *Bottom-up* approaches are generally structured according to the same hierarchal phases. However, initiators are involved from the beginning. In contrast to the traditional process, they have *full control* over the actions taken.

The Collective Private Commissioning (CPC) is an example of a *bottom-up* approach. Within this approach, future-users take the initiative together. A benefit of this approach as opposed to private commissioning (PP) is that responsibilities are shared and risks are carried collectively. Secondly, due to the process itself -working together- it holds the potential to contribute to strong social bonds and a sense of community (Sanders, 2017). Despite these benefits, CPC projects still have significant

obstacles to overcome. First, the motivation and time to remain effective on the part of users (Sanoff, 2000). Second, individuals often have a short term view and professionals involved are often stuck in their assignment (Sanders, 2017). Due to the short term view on the part of initiators, these projects are likely to result in individual solutions. Projects don't offer the same benefits of user-involvement when users change. Furthermore, initiators generally involve exclusively well-educated middle-class families. As a result, *bottom-up* approaches have a somewhat exclusive character.

The difficulties individuals -in particular, vulnerable groups- currently experience with getting involved within the design and building process are due to tender procedures, a gap between users and architects, the complexity of the build process, the attitude of professionals and financial limitations. In order to adapt the built environment to the increasingly diverse needs -beyond household composition- it is necessary to explore alternative approaches which enable users to take part within the realization of dwellings.

3.2. Why should users be involved in the process?

The gap between the expectations of users and the actual design -the planned- has been recognized. The traditional architects-as-artist is no longer valid. It is necessary for architects to adapt their approaches in order to put users at the center of the design. This requires an emphasis on the process. Viewing buildings as a set of practices allow for restructuring these practices, meaning that architects can adapt their approaches in order to facilitate the needs of users. This includes restructuring the conventional processes of designing, building, and occupancy.

The importance and the role of the participation of users in design has been debated in multiple contexts involving; functionality, culture, usefulness, social responsibility, identity, design education and sustainability (Harder et al., 2013). This paper focusses on three benefits of user-involvement within the realization of dwellings; individual agency, appreciation for the design outcome and usability.

-*Usability:* Accusations have been made against architects having insufficient knowledge about users. User-involvement is aimed at a mutual learning situation (Harder et al., 2013). It enables architects -or users- to make informed design decisions, in order to meet the needs and wants of dwellers. Therefore, user-involvement enhances the usability of the dwellings. The overall goal of theories of user-involvement share the following understanding: 'to develop a suitable product that will function for its users' (Wim et al., 2016).

-*Empowerment & individual agency:* User-involvement in the realization of dwellings enables users to influence the conditions of their daily lives. As a result of increased control on actions taken throughout the process, the design outcome is likely to result in dwellings which reflect the needs and preferences of users. Control affects the psychological attachment of a resident to the place, affects the health of dwellers (Overtoom, 2017), and gives the possibility to invest and *move forward* in society. Hill (2001), argues that users who are *creative*, take up a role which is *equal* to that of the architect.

-*Appreciation & engagement:* Another benefit of user-involvement is that it can foster a positive attitude towards the project outcome. The *act* of designing and building can be of added value to users. Currently, the home-making process tends to be overlooked (Overtoom, 2017). Dwellers have a need to continually interact with, engage with, and adjust their dwellings while living in it.

3.3. What are the characteristics of users-involvement within the process?

This section elaborates upon the characteristics and parameters of user-involvement within the realization of dwellings. User-involvement strategies are different in multiple ways. Such as the *goal* at which it is aimed, the *phase* in which users are involved and the *degree* of involvement. Secondly, the setting, scale, and user characteristics play a role.

3.3.1 User characteristics

As much as user-involvement can be beneficial, it can become a burden (Appendix A). Several studies (Oijevaar et al., 2009; Kaulio, 1998; Spinuzzi, 2005; Kensing & Blomberg, 1998) have

addressed the role of user-characteristics in a project process. Users *willingness*, *resources*, and *skills* play a role in what issue and what extent they could -or should- be involved within the process. The *willingness* of users is influenced by ownership: home-owners are more likely to be motivated to take part in the creation of spaces. Also, the expected time of occupation affects the motivation. The identification of users *skills:* such as language and communication skills, organizational, (tactic) knowledge and experience, is necessary in order to come up with an appropriate response which takes in account the strengths and weaknesses of the different approaches. Secondly, the *resources* vary widely. These include time, financial resources and consultancy relations.

3.3.2. Time span covered by user-involvement (phase)

Each phase within a project is characterized by the specific actions taken and issues that are being addressed. In order for architects to come up with an accurate response with regards *where* to involve users in the process, insight into the different goals of involvement for each phase is necessary. Therefore a general overview of the different phases within the process is set. The phases include; the initiative, design phase, preparation for construction, building phase and occupancy. For each phase, the specific goals of involvement are highlighted (figure 2).

Initiative: Within this phase user profiles are developed. User-involvement contributes to the profile of users that can put them in the center of the building production. Secondly, involvement during the initiative allows users to control the investments made.

Design phase: Participatory design approaches, as used by the industrial sciences, are characterized by the intention of establishing a mutual *learning situation* between users and designers (Simonsen, 2012). Within the design phase, the greatest potential exists to influence all aspects of the project outcome. Therefore user-involvement within this phase designs are most likely to be adapted to the needs and wants of users.

Preparation for construction: These are often less relevant in new buildings. This is particularly important when the building is being occupied by users, which can be the case in dwelling transformations.

Building phase: There are examples of housing designs of people living in poverty and refugees had been offered a supported self-built house instead of a prefabricated one. The problem in such cases is that the residents had no influence on the design of these houses (Overtoom, 2017).

Occupation phase: Benefits of the involvement of users within this phase allows for the 'real knowledge' about the relationship between users and the building. Being responsible for the *maintenance* has proven to be able to reduce the cost in some cases, as well as contribute to a sense of ownership.

3.3.3. Degree of user involvement

This section elaborates on the degree of user involvement. The degree of involvement or depth of participation is influenced by the attitude of actors, the assumptions made and the actual actions that are being taken. Based on the understanding of user-involvement within the realization of dwelling gained from the literature review on user-involvement, three general categories have been identified; production *for* users, production *with* users and production *by* users (appendix B). Each category is described according to the typical attitude of architects, the typical actions taken and the role of users.

Production for users: This category is informative: architects learn about or study users (Harder et al., 2013) in order to come up with responses that incorporate their needs and wants. Meaning that users take up a *passive* role. A typical attitude of architects is that they recognize that users may have different ways of acting, knowing and thinking and that input of users is potentially useful (Harder et al, 2013). However, architects still take the final decisions.

Production with users: User-involvement in his category is consultative. It implies an *active* role for users. Meaning that users provide architects with feedback on for example design alternatives. A

challenge with projects within this category is that users generally experience difficulties in understanding the design alternatives (Kim et al., 2016). Architects recognize that there may be some value in the users' ways of thinking knowing and acting and take users contribution seriously, but still make the final decisions.

Production by users: This category implies participation. Users have control over the decisions made and either an *active* or *creative* role. This category would have most of the benefits that user-involvement could bring but would require the biggest efforts in order to coordinate the process (Kim et al., 2016).

Within this category, the degree of user-involvement is sub-divided in *choice* (weak control), *co-design* (shared control), *self-design* (full-control) (Kaulio, 1998) as shown in figure 2. *Choice* involves users choosing from a range of options, largely determined by architects. *Co-design* involves learning together (Harder et al., 2013). Architects recognize that there is added value in working with users. It means that the user and architect are equal in status, however probably operate on different domains. In this category, architects work with users to co-create new ways at the interface between user and architects. Involvement within this category, therefore, may take the strengths and weaknesses of the different approaches in account. In the category, *self-design* users have full control. They may take advice or consult professionals.

3.5. How to categorize and compare user-involvement strategies within the realization of dwellings?

Based on the understanding of user involvement and the research purpose, characteristics that the proposed framework should satisfy are formulated. Firstly, the framework must be constructed in order to categorize and compare the strategies for the realization of dwellings which involve a combination of user-involvement strategies and open building strategies. Therefore the different strategies must be mapped directly onto the framework. Secondly, the framework should support architects in order to make conscious decisions towards different approaches. Therefore, the goals of involvement should be linked to the phase, domains, and degree of involvement. The differences must be easy to grasp.

As discussed within the previous section, important criteria for user-involvement are the level of the *degree of involvement* and *the time-span (phase)*. In order to categorize the different strategies towards user-involvement, a general overview of the domains of involvement was compiled. This overview indicates on what domains of the building system users can influence. As shown in figure 2, these domains include; public-private, spatial arrangement, building orientation, materials, signing, services, bathroom fixtures, and kitchen equipment.

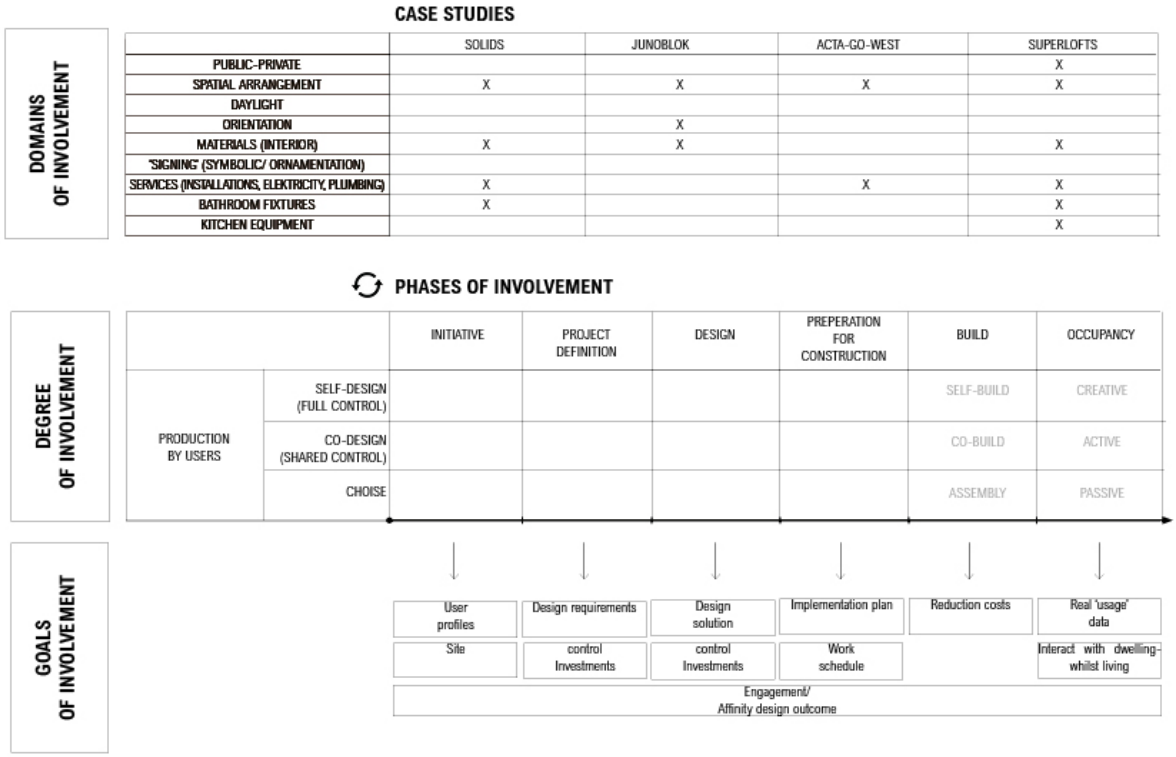

Figure 2. Framework for the categorization of a combination user-involvement strategies in the transformation of dwellings

IV. CASE-STUDIES

As mentioned before various case-studies were conducted in order to explore the various strategies for user-involvement, particularly focused on dwellings in the Netherlands. Next, to the categorization, the required effort, skills, benefits of users-involvement and time were investigated. Within the case studies, the type of user, design intention and site were considered. The selected cases all involved a transformation of physical structure within the Netherlands. Within each case user were involved during the design, build phase or a combination of both. The case studies were intended to validate the de framework.

4.1. SOLIDS: support as an envelope

Solids is a mixed-use building in Amsterdam-West, based on open Building principles. Within the building, a distinction is made between the 'infill' and the 'support'. In this case, the support is owned by the housing corporation and its residents have ownership over the infill. According to the initiators the 'support', has a lifespan of 200 years, compared to the usual lifespan of 50 years. The objective was to provide space for a variety of uses in order to create a lively mix. Regulations required that at least 40% of the building should be residential, this includes social housing.

4.2. SUPERLOFTS: support as an envelope

Superlofts is a co-living and development model based on the Open Building principles. Superlofts separates the temporary infills from the permanent support structure, facilitating space for people to build their own house. Here a prefabricated concrete base structure provides the framework.

4.3. ACTA-GO WEST: support as services

Acta is the former dental science building from Amsterdam University. The association that bought the building wanted to demolish the building in order to redevelop the area. Because the demolition was postponed, the building was partly transformed. This included workplaces (ground and first floor) and affordable housing units for students. Students who were involved in the build process (for example the

placement of partition walls) would get a discount. Secondly, they were given the possibility to take up an active role with respect to the maintenance in exchange for a discount. The involvement of users resulted in a reduction in costs on the part of initiators.

4.5. JUNO-BLOK: support as services

The former office building was owned by the municipality. Due to the low demand for office buildings, plans were made for redevelopment: transforming the building into apartments intended for ownership. The sell and transformation were faster than planned. Tenants could buy units and combine these according to their needs and wants. The finishing of the interior by tenants would save time and costs on the part of the developer.

4.6.. Findings

In the majority of the selected cases, attention was given to the needs of dwellers to interact and engage with their dwellings. This was not the case in ACTA-go West. The combination of open building strategies and user-involvement in some cases proved to have a positive impact on the *usability* of the building. Within Solids, different ways of dwelling were made possible, such as divorced parents, raising their kid together. The cases Solids and Junoblok revealed the diverse wants of its users with respect to individual investments and the implementation plan. In the case of ACTA-Go-west users were involved within the build and occupancy phase. As a result, the user-involvement did not affect the usability. In some cases, user-involvement in the build and occupancy phase was particularly aimed at a reduction of the costs. It has proved to be successful with respect to the initiators (ACTA, Juno-Blok) and tenants (ACTA).

The majority of the approaches within the selected cases involved *self-design.* In the cases, Junoblok and Solids, the transformation by users involved completely separated process, which started after the completion of the support. In these cases, little to no efforts were made to support users within the transformation of their dwellings. Due to the complexity and considerable effort the transformation required, users experienced difficulties within this process. These user-involvement strategies can benefit from collaboration between users and architects. For example by adopting approaches such as *co-design*, or *choice* in order to overcome the difficulties users were experiencing. In the case Superlofts the possibility to consult architects was given (against payment). This support service, offered by the initiators has proved to be helpful to the users.

The *degree of involvement* and the *domains of involvement* appeared to be closely connected to the building model. The cases revealed different strategies towards the *levels of change.* The support; support as a *structure*, support as an *envelope* and support as *services.* Within the cases, the physical structure -the support- lowered current barriers for users to get involved. However, the design of the support had an impact on the potential responses on the part of users. In all cases, they were limited by the supporting structure. Due to the maximum flexibility, support as *structure* enabled users to get *involved* in all *domains of involvement*. Support as an *envelope,* involved a somewhat more deterministic approach, due to the decreased flexibility the potential design solutions were limited.

The systems within the cases have the possibility to be renewed easily in compared to conventional dwellings, however, it takes considerable effort. Little measures were taken in order to realize an *adaptable* infill. The user-involvement strategies, therefore, could greatly benefit from additional input from design for disassembly.

V. CONCLUSIONS

The framework presents a way of thinking about and setting out the different aspects of user-involvement. User-involvement within the realization of dwellings has multiple benefits for users. It holds the potential to increase the level of individual agency and control, increase the appreciation and engagement for the design outcome and usability of the dwelling.

User-involvement requires additional efforts to coordinate the process. Architects can adapt their approaches with regards to user-involvement in order to meet the need of both current and future users. This includes restructuring conventional processes of commissioning, designing, building, and occupancy. User-involvement strategies are different in multiple ways. Such as the *goal* at which it is aimed, the *phase* in which users are involved and the *degree* of involvement. Secondly, the setting, scale, and user characteristics play a role.

Based on the results presented in this paper it could be concluded that open architecture principles can support users in the transformation of their dwellings in order to better fit their needs and wants. The systems of the selected cases have the possibility to be renewed easily compared to conventional dwellings in order to meet the needs of both current and future users. However, little to no attention was given to the adaptability of the infill. The transformation it still involved considerable time, effort and complexity in the majority of cases. The combination of open building strategies and user-involvement strategies within the selected cases could therefore greatly benefit from a collaboration between architects and users within the realization of their dwellings (approaches such as *co-design* and *choice*) as well as input from DfD.

The framework presented within this paper gives a general overview of the way users are involved within the selected cases. A rich variety of cases can be compared based on specific aspects and the results can be mapped directly onto the framework. Even though the projects are only a small selection of the realized projects in the category production *by* users, it could be concluded that the division within the category production *by* users; choice, co-design (shared control) and self-design (full control), enabled highlighting the different approaches. However, the divisions within the category production *by* users; choice, co-design (shared control) and self-design (full control), introduces some difficulties with respect to the build occupancy phase. The generalization of the user-involvement concepts allows for conceptualization and communication. However, due to this generalization, the framework can't reveal differences between approaches which belonging to the same categories.

The framework is not an end itself. Rather, it is intended to be a to facilitate conversation about user-involvement in dwellings. It may raise awareness by architects and users on the wide variety of approaches and the needed attitude. The goals of involvement offer a clear overview and are easy to grasp. Therefore it can support architects in making conscious decision with regards to what phase, what domains and to what extent users could or should be involved within the realization of dwellings.

VI. RECOMMENDATIONS

-Linking existing methods of user-involvement to the framework in relation to the phase of involvement, goals of involvement and domains of involvement. These may include; user-driven innovation, user-centered design (UCD), user-involvement in briefing, lead user innovation, computer supported cooperative work (CSCW), participatory design, usability appraisal, post-occupancy evaluation(POE). And mapping the accompanying tools, techniques, and principles of organization of the onto the framework.

-Additional interviews, documentation, observations with respect to the experiences of users towards the process and their appreciation for the design outcome.

-Additional case-studies in order to validate the categorization.

-Additional case-studies in order to explore additional goals of involvement.

-Investigation of proposing a normative framework with regards to what issue users should be involved in the realization of dwellings.

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APPENDIX A

SOLIDS

Solids is a mixed-use building in Amsterdam-West. The concept derived from the theory of Habraken. Within the building, a distinction is made between the 'infill' and the 'support'. In this case, the support is owned by the housing corporation and its residents have ownership over the infill. According to the initiators the 'support', has a lifespan of 200 years, compared to the usual lifespan of 50 years.

The objective was to provide space for a variety of uses in order to create a lively mix. Regulations required that at least 40% of the building should be residential, this included a share of social housing.

Building model

The building model here suggests a specific strategy for users to get involved. The 'support' in Solids includes the façade, a courtyard, circulation spaces, connections to the central installations and structure. The domains of influence – the infill- include the partition walls, finishing, plumbing and installations. The 'infill' is owned by the tenants. The concept is based on the fact that residents can sell their 'infill' when they move elsewhere. The costs for the completion of the dwellings were estimated at 20,000 euros. Due to this risk on the part of the tenants, several people who were interested decided not to go through with their plans.

In order to achieve this distinction between the 'support' and 'infill', the floor of the circulation spaces was raised to provide the dwellings with space for installations underneath the floor finishing. Secondly, the facades were made load-bearing in order to maximize the flexibility in the plan. Thirdly, structural floors were overcalculated in order to meet regulations related to different uses.

Process

Within the overall development process, the 'support' and the 'infill' were independent processes. The process of the infill started after the completion of the support. An advantage of this approach is thatend-userss got a better picture of their dwellings and therefore a better sense of the potential design solutions within their homes. This supported users within the design process of their dwellings.

There was little *guidance* within the process of the 'infill'. Several residents have expressed their disappointment. Up to the completion of the support, users had received good assistance. However, after the rental contracts were signed, the housing cooperative was insufficiently accessible for questions and complaints. The greatest difficulties that were encountered by residents were related to the realization of the installations. In this respect, a *collaboration* between the tenants and professionals would have been of added value.

Degree of involvement

The influence of residents on the layout is limited. Various apartments were 'auctioned': residents could determine the size of their dwellings. The lack of freedom in the facade - due to the position of the pennants - in combination with the positioning of the shafts resulted in illogical subdivision of the apartments. This has a negative impact on the usability and spatial quality of the dwellings. Users complained about losing too much space within their dwelling on circulation spaces. Due to this subdivision, the choice on the placement of the separation walls has no added value

beyond a choice in dwelling size. In addition, it is likely that the subdivisions will maintain their position in the near future when tenants change. Particularly from the perspective of future tenants, the illogical subdivision is a limitation on the degree of influence within the design of their dwellings.

Conclusion

-Appreciation: For many users, the influence on the design of their homes was of added value.

-Individual agency: The building model allowed for alternative concepts. It enables unconventional ways of dwelling, which currently aren't facilitated by the current building stock. For example, divorced parents who wanted to raise their child under the same roof.

In terms of the process, users were in control of the *implementation plan* and their *investments*. The control on the investments proved to be of added value: the costs made by residents were far more differentiated than the estimates made by the housing corporation.

-Adaptability: In this case, the 'support' can facilitate changing use. Thus, the supporting structure is future-proof. However, when it comes to the infill, few measures have been taken to facilitate the changes, both in the lifestyles of current users and changing users.

The *time and effort* needed byend-userss have been greatly reduced compared to CPO and PP due to the supporting structure. However, some residents experienced their involvement in the realization of their dwellings as a burden. Others experienced their involvement to be of great value. The result outweighed the invested time and effort.

The building strategy leaves a large number of options open. This has greatly increased the building's capacity to adapt to changing use. However, the large number of options has had consequences for the usability, spatial quality of the infill and the extent to which residents can influence the design outcome. In respect to both current and future users.

The expectation was that facilitating a large number of uses would result in a lively mix within the building is in contrast to reality. As 60% of the building currently functions as a hotel, there is a mismatch between the lifestyles of users. This has had a negative impact on the residents' appreciation for the collective courtyard. The *appreciation* of users for their living environment is dependent on other users. The impact of changes in use on other tenants is an important aspect to take into account. Development of the concept with respect to the (social) organization could offer a contribution in order to increase the appreciation of users of their living environments.

USER-INVOLVEMENT:TRANSFORMATION

CASE STUDIES

DOMAINS OF INVOLVEMENT

	SOLIDS	JUNOBLOK	ACTA-GO-WEST	SUPERLOFTS	OKOHAUS	NEXT-21
PUBLIC-PRIVATE						
SPACE ARRANGEMENT						
DAYLIGHT						
ORIENTATION						
MATERIALS						
'SIGNING' (SYMBOLIC/ ORNAMENTATION)						
SERVICES (INSTALLATIONS, ELEKTRICITY, PLUMBING)						
SANITAIR						
KITCHEN EQUIPMENT						

PHASES OF INVOLVEMENT (ITERATIVE PROCESS)

DEGREE OF INVOLVEMENT

		INITIATIVE	PROJECT DEFINITION	DESIGN	PREPERATION FOR CONSTRUCTION	BUILD	OCCUPANCY
PRODUCTION BY USERS	SELF-DESIGN (FULL CONTROL)					SELF-BUILD	CREATIVE
	CO-DESIGN (SHARED CONTROL)					CO-BUILD	ACTIVE
	CHOISE					ASSEMBLY	PASSIVE

GOALS OF INVOLVEMENT

INITIATIVE	PROJECT DEFINITION	DESIGN	PREPERATION FOR CONSTRUCTION	BUILD	OCCUPANCY
user profiles	Design requirements	Design solution	Implementation plan	Reduction costs	Real 'usage' data
-Site	control Investments	control Investments	Work schedule		Interaction / engagement

USER-INVOLVEMENT:TRANSFORMATION

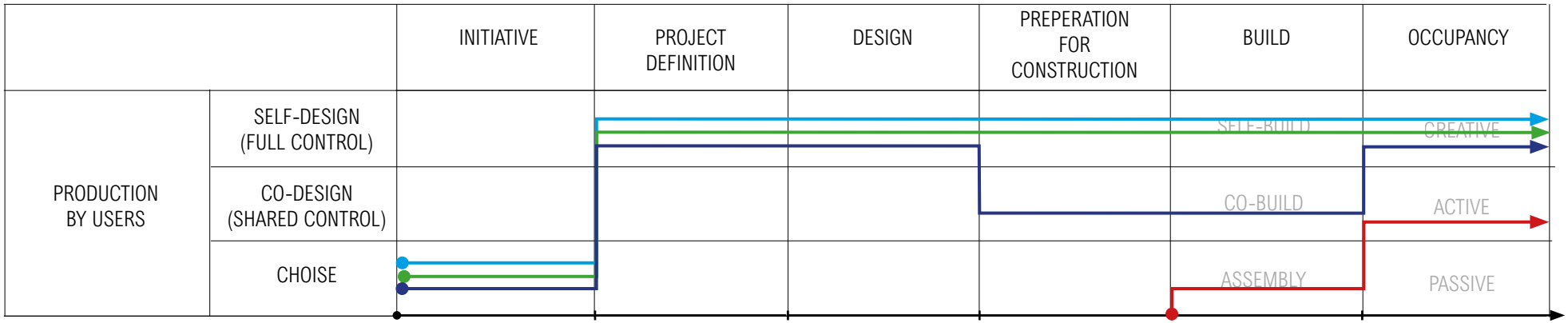
CASE STUDIES

DOMAINS OF INVOLVEMENT

	SOLIDS	JUNOBLOK	ACTA-GO-WEST	SUPERLOFTS
PUBLIC-PRIVATE				X
SPATIAL ARRANGEMENT	X	X	X	X
DAYLIGHT				
ORIENTATION		X		
MATERIALS (INTERIOR)	X	X		X
'SIGNING' (SYMBOLIC/ ORNAMENTATION)				
SERVICES (INSTALLATIONS, ELEKTRICITY, PLUMBING)	X		X	X
BATHROOM FIXTURES	X			X
KITCHEN EQUIPMENT				X

PHASES OF INVOLVEMENT

DEGREE OF INVOLVEMENT



GOALS OF INVOLVEMENT