

Article

Co-Design and Co-Manufacturing: A Multidisciplinary Approach through Small-Scale Architectural Experiences in Barcelona

Marta Domènech-Rodríguez ^{1,*}, Còssima Cornadó ² , Sara Vima-Grau ³, Gonzalo Piasek ² ,
Ainhoa Varela-Conde ² and Pere Joan Ravetllat Mira ³

¹ Centre for Research on Architecture, Society & the Built Environment, ETH Zurich, 8049 Zürich, Switzerland

² Architectural Technology Department, Universitat Politècnica de Catalunya—BarcelonaTech, 08028 Barcelona, Spain; cossima.cornado@upc.edu (C.C.); gonzalo.piasek@upc.edu (G.P.); ainhoa.varela@upc.edu (A.V.-C.)

³ Architectural Design Department, Universitat Politècnica de Catalunya—BarcelonaTech, 08028 Barcelona, Spain; sara-vima@upc.edu (S.V.-G.); pere-joan.ravetllat@upc.edu (P.J.R.M.)

* Correspondence: domenech@arch.ethz.ch

Abstract: This article aims to explore the potential and limitations of participatory design and co-manufacturing processes, taking the city of Barcelona as a reference. It is characterized by an aging building stock, tourist pressure, and difficulties for citizens in accessing affordable housing. In this sense, a selection of six cases of co-design and co-manufacturing is presented, as a range of small-scale interventions that were shared and discussed in the “Debate sessions. Co-Design and Co-Fabrication in Architecture” within the Co-Hab-Raval project, which motivated this research. Thanks to these case studies, it has been possible to analyse a wide range of intervention practices. The article exposes the socioeconomic context of Barcelona and its lack of affordable housing, which motivated the practices presented. In addition, the cases are carrying out a comparative analysis based on the parameters of agents involved, the type of users’ participation, and materials resource management. Finally, the results obtained highlight the relationship between the construction systems and the self-construction and reuse strategies used, as well as the importance of the plurality of agents that intervened in the design process to enrich the proposals and empower users, especially in vulnerable environments.

Keywords: co-design; co-manufacturing; self-construction; sustainability



Citation: Domènech-Rodríguez, M.; Cornadó, C.; Vima-Grau, S.; Piasek, G.; Varela-Conde, A.; Ravetllat Mira, P.J. Co-Design and Co-Manufacturing: A Multidisciplinary Approach through Small-Scale Architectural Experiences in Barcelona. *Buildings* **2023**, *13*, 1159. <https://doi.org/10.3390/buildings13051159>

Academic Editor: Nikos A. Salingaros

Received: 16 March 2023

Revised: 20 April 2023

Accepted: 22 April 2023

Published: 27 April 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

This article aims to show different strategies of co-manufacturing and co-design, as well as policies addressed in the context of architectural reuse in the city of Barcelona.

The growing need for a shift towards a circular economy (CE) [1–3] has positioned the reuse of buildings and construction elements in our cities as both a necessity and an opportunity. That is why, following the objectives set by the European Union, the lines of action applied in Spain place the construction industry as one of the first sectors to transform. This is because it is responsible for almost 40% of all waste produced and almost 30% of greenhouse gas emissions (GHG), and one of the main objectives of the 2030 Agenda [4] is a reduction in the consumption of materials used in construction by 30% and the emission of GHG by 50%. To achieve these objectives, architectural reuse is being seen as a necessity and the vision of the built environment as a resource that is not only physical but also cultural, which can in turn be reinvented, improved, updated, and transformed, is emerging again.

In this sense, some of the practices presented take as references practices from the last quarter of the 20th century, for which, the existing city was rediscovered, and among the buildings or aspects to be preserved, not only the monuments were considered, but also the existing dwellings and the social structure of the city [5], as can be exemplified

in the Amsterdam Declaration of 1975 [6]. The policies of the late 1980s, 1990s, and the first decade of the 21st century, such as the land liberalization promoted by the Aznar government, led to massive speculation in the real estate sector and a large indebtedness of Spanish families in mortgages to gain access to housing. This dynamic exploded with the global financial crisis of 2008 and previous practices are being recovered.

This article collects and compares the contributions of the experts invited to the symposium “*Jornadas de Debate. Co-Diseño y Co-Fabricación en arquitectura*” [7] focused on the role of architecture in co-design and co-manufacturing processes in architectural reuse in our existing cities. This debate was carried out in the framework of the research project Co-Hab-Raval [8]. A selection of case studies from these previous discussions is presented in this article in order to show different methods of co-manufacturing and co-design through the involvement of different stakeholders and different scales of action, which vary from urban to household in the city of Barcelona. At the same time, this compilation of projects framed in the same geographical, economic, and legal context allows us to contrast the limits and possibilities of the different strategies addressed.

These experiences raise a debate around the possibilities for the involvement in architectural processes of communities in the design, construction, transformation, appropriation, and management of their inhabited space. At the same time, these architectural practices also play a role in addressing socio-economic urban issues—such as real estate speculation or energy poverty in the city—that, by making them visible and providing material solutions, could have implications in the debates around the need for new regulations.

2. Theoretical Framework: Architectural Reuse and Self-Construction through Co-Manufacturing and Co-Design Processes

2.1. Environmental Sustainability in Reuse Practices

Our cities need to become more sustainable and resilient to achieve the goals of the European Green Deal. In our case, this requires the transformation of existing buildings and their adaptive temporary reuse, improving the well-being and quality of life of citizens and fostering social inclusion and environmentally responsible economic growth [1]. Currently, many cities continue to cover their space needs with new buildings and land consumption. The European Commission (EC) adopted in 2014 a package of measures that includes proposals to revise legislation to stimulate the transition from a linear economy towards a circular economy [9–11]. In addition, this package included, as a new challenge, the reuse and transformation of existing buildings, particularly those in disuse or that are underused, with the logic of creating new economic and social opportunities aligned with the principles of the CE to:

1. Take advantage of existing common spaces.
2. Improve the environmental performance of buildings throughout their life cycle [2].
3. Propose new scenarios for urban entrepreneurship [9–11].

However, the way we are materialising architecture so far makes it difficult to achieve both the goals of the 2030 Agenda [4] and those of our cities in terms of sustainable, environmental, economic, and social development [12]. There is a need to improve tools and methodologies to think more carefully about how we manage, use, and reuse all the built environment, as well as the rest of the natural resources.

From our point of view, in terms of social inclusion, adaptive reuse of existing buildings can offer citizens and communities an opportunity to participate in the life of the city more easily [13,14], compared to new construction or comprehensive refurbishment commissions. In addition, the accommodation of new functions and flexible uses within buildings originally designed for other activities can have a positive effect on the environment, creating a social impact through job opportunities and community involvement [15]. The consumption model born of industrialisation implies the infinite use of finite resources and the accumulation of waste, i.e., a linear system of wasting. However, new models based on sustainability are related to reuse and recycling in order to close the cycle and limit the consumption of new resources. It is necessary to rethink cities taking into account

the space needs, related to the physical, social, and economic local necessities that only a truly participated diagnosis, one that is based on a global, sustainable, resilient, and inclusive vision of the city, can express. This approach to rethinking the city must take into account the changing needs and ambitions of neighbours through spaces that can contain temporary uses at relatively low costs, that are able to offer access to housing for citizens at risk of exclusion, and to open up new spaces for new local economic activities.

2.2. Socio-Economic Sustainability by Improving Self-Construction Practices

Self-construction has been historically identified with slums or informal settlements, although an increasing number of studies identify the phenomenon of self-construction in some European cities [16]. It is currently estimated that around one billion people live in informal settlements [17], either in the form of the construction of new housing plots or the occupation of abandoned buildings, and this figure is on the rise. However, gradually, with the impossibility of accessing the formal housing market, it is increasingly important to recognise that the collective work of people and non-lucrative organisations has been able to effectively and quantitatively partially solve the need for safe housing provision through self-construction strategies and the social production of habitat.

In this article, we interpret the subject from the perspective of the relationship of the users with their environment and space, as an essential link for architecture and urban planning [18,19], in accordance with the conception of “holistic thinking” proposed by Patrick Geddes [20] and applied by Turner [21] in the concept of relational housing:

‘It’s the relationship that matters! We’re not talking about people, we’re not talking about buildings, we’re talking about the relationship between them’ [20]. Geddes insists that the ‘value’ of the building, besides its value as an object, includes the relationships between itself and its context, and holds its inhabitants and activities [22].

From this perspective, self-construction gives rise to thinking about mutual recognition between actors: institutions, technical professionals, and users, highlighting and encouraging each other to develop skills and knowledge in order to generate processes of self- (or rather co-) construction. In addition, it fosters another kind of relationship between technical knowledge, architectural space, and environment and management [23]. If participatory architecture is based on the need to generate habitat alternatives and also based on a democratisation of design processes [19,24], following Turner, it is not only about the design of the space itself but also about its construction and/or management (and we would add, its transformation and appropriation in the long term).

It is along these lines that mixed formulae emerge and public institutions, or public-private partnerships, play a key role in facilitating and assisting community practices of self-construction [23,25,26]. According to Turner, far from the concept of Self-Help Housing promoted by the World Bank, in which the users contribute by working on the construction, but their influence in decision-making is marginal [27], the optimal situation would be one in which the maximum management and decision-making role falls to the users, regardless of their direct contribution to the physical construction. To this end, institutions should provide the indispensable ‘tools’ or ‘elements’ to enable a constructive and urban quality of development (materials, tools, labour, technical assistance, and financing) [22].

Contrary to an understanding in which the architectural project is detached from users’ reality, different professional profiles are configured depending on the relationship with communities: ‘architect-manager’ or ‘architect-subordinate’ vs. ‘architect-interpreter’ [22]. In this way, multiple actors (users, architects, construction professionals, material suppliers, institutions, etc.) make agreements on all aspects that lead to the construction [22,23,28,29].

What is also shown in this paper is one of the main limitations in their implementation, as they are neither credible nor imaginable in environments where there is no active participation and organisation of the people involved. From our point of view, beyond influencing legal and institutional pitfalls, the expansion of processes of self-construction, participation, and direct action in architecture can be possible. The experiences of neighbourhood involvement that are not based on a strong associative and community fabric

either exemplify forms of symbolic representative participation or are incapable of crystallising and remaining in the medium and long term, once the process that motivated them has ended [30].

The main architectural advantages of self-construction processes are usually described on the basis of the conception of housing as an open system, based on structures adaptable to the changing needs and evolutionary patterns of the living units [23]. They also represent a way of promoting circularity and, as we saw in the previous section, the reuse of existing spaces and materials as local resources [31]. Furthermore, self-construction is linked to multidisciplinary participatory processes, which from the social sciences perspective, encourage the participation of neighbours in decision-making and strengthen citizens' ties, which generates a more resilient social fabric [32].

If we start from the premise that the involvement and direct action of the inhabitants in the design, construction, or management of their living space is a way of making the right to decent housing and habitation effective, especially in places where there is a greater housing emergency, it is worth asking what are the possible and desirable ways of introducing self-construction processes into architectural practice in our existing cities in a qualitative and quantitative way.

3. Methodology

3.1. Research Context and Case Selection

After the global financial crisis, the alarming consequences of the commodification of housing in Barcelona became evident, exacerbating social inequalities [33]. The structure of residential tenure in the city is one of the reasons why economic crises have a strong impact on housing. As can be seen in Table 1, the city can only offer 2% of public accommodation, the rest is divided between owner-occupied housing (66.6%) and rental housing from the private market (31.3%). In this context, operations of renovation can lead to processes of gentrification and expulsion of the most vulnerable neighbourhoods.

Table 1. Compared types of tenure in Barcelona and Spain with other European cities and countries [34].

City/Country	Housing Stock Total	Housing/10,000 Inhabitants	Housing Stock Owned (%)	Open Market Rental Housing Stock (%)	Social Rental Housing Stock (%)
The Netherlands	7,107,000	423.0	58.0%	10.0%	32.0%
Amsterdam	398,565	491.3	28.0%	24.0%	48.0%
Germany	41,183,333	508.0	43.0%	51.0%	6.0%
Berlin	1,883,161	550.3	14.0%	55.7%	30.2%
United Kingdom	23,400,000	443.0	66.4%	15.6%	18.0%
London	3,383,030	410.0	57.0%	19.0%	23.0%
France	33,672,308	519.0	57.7%	25.2%	14.6%
Paris	1,356,074	602.7	33.1%	44.3%	17.2%
Spain	25,129,000	544.0	85.0%	11.0%	2.0%
Barcelona	811,106	506.0	66.6%	31.3%	2.0%

Barcelona, and in particular the *Ciutat Vella* district, is a city in which its residents can live in precarious spaces, while some neighbours or local enterprises are stifled by high rental prices. One of the main consequences of this fact is the great vulnerability of the residential stock to the rules of the real estate market and the significant instability of housing stock by the high incidence of tourism in the city. In addition, the accumulation of urban land by large private landowners after the global financial crisis of 2008 has worsened in the last decade, as well as the availability of urban land for new construction [35].

Furthermore, the city has dense, old, and inefficient building stock in terms of energy, with building stock destined for residential use accounting for 52% of the city's total roof area and an average age of 63 years [36], and in terms of accessibility [37,38], which affects the most vulnerable groups and disadvantaged tenants, worsening their situation, since, as shown by the *Observatori Metropolità de l'Habitatge de Barcelona* [39], 25% households are below the energy poverty level, as they spend 10% or more of their income on paying energy costs. This situation worsens the living conditions of the most vulnerable [40–42].

This residential precariousness and social vulnerability are even greater in the *Ciutat Vella* district, where most of the projects presented in this article are located. This district, despite having the lowest population under the age of 65, with 12% (3.77% of the total population of the municipality) [43], has the lowest life expectancy, with an average of 81.6 years compared to the average of 84.2 years in Barcelona [44]. On the other hand, in terms of economic vulnerability, the Family Disposable Income (RFD) index for *Ciutat Vella* in 2019 was 84.3, below the 100 level for the city; 31.4% of the population living in the district lives below the poverty line, which means that they live in a household with an income below 60% of the average annual disposable income of individuals. It is worth noting that this rate is the second highest in the city, exceeding the Barcelona average by 11.8 points [45]. In addition, it is also the district with the highest rate of severe material deprivation, at 11.52% in 2017, higher than the average of 7.47% [46], along with the highest unemployment rate in the city with 1405 people with more than 12 months of unemployment [47]. In addition, *Ciutat Vella* is the district with the lowest average salary per person at 22,529€/year compared to the city average of 31,076€/year [48].

In this context, within the city of Barcelona, we find that it is possible to explore new practical methodological approaches that explore new legal and formal frameworks to work on residential rehabilitation without accusing the gentrification processes that can threaten the building stock under the real state market rules. This was one of the goals of the project in which this research is framed, the Co-Hab-Raval [8]. It was focused on improving the living conditions of the communities of *El Raval* neighbourhood, in the historical center of Barcelona, through co-designed and co-manufactured solutions, which is one of the comparative case studies of this article. Within the framework of the Co-Hab-Raval, the symposium “Jornadas de Debate. Co-Diseño y Co-Fabricación en arquitectura” [7] was held. There, recent practices of co-design and co-manufacturing were collected that laid the foundations of the current context in reference to these issues. The contributions were divided into two blocks:

Co-design block:

- *Pla de Barris* (Neighborhood Plan). Barcelona City Council [49].
- *MISMeC*. Teaching experiences. UPC [50].
- *Recetas Urbanas* (Urban recipes) [51].
- *Arquitectes de Capçalera*. UPC [52].
- *Proceso de co-diseño y construcción de vivienda de bajo coste sostenible en el norte de Kenia* (Process of co-design and construction of sustainable low-cost housing in northern Kenya). Zeltia González [53].

Co-manufacturing block:

- *Space Saloon*. Kent State University [54].
- *Procesos de autoconstrucción en el barrio del Carmel* (Self-construction processes in the Carmel neighborhood), Barcelona, El Tínglado [55].
- *Construim-nos*, Makea Tu Vida [56].
- *REEhabilitant El Raval*. Propuesta de autogestión en rehabilitación energética de hogares vulnerables (Proposal for self-management in energy rehabilitation of vulnerable homes). UPC [57].
- *Programa de mejoramiento de vivienda por autogestión Barrio Mugica* (Self-management Housing Improvement Program. Barrio Mugica), Bs. Argentina. Estudio de Arquitectura NDG [58].

The experiences exposed were varied in scale, scope, and budget, however, they all shared the need to activate architectural practices against the precariousness of housing. In addition, all of them highlighted the need to implement the use of resources, self-construction, and multidisciplinary participation as necessary tools to improve habitability.

In this article, a selection of case studies from these previous discussions is presented to show different methods of co-fabrication and co-design through the participation of different actors and different scales of action, ranging from the urban to the domestic in the city of Barcelona. Accordingly, six experiences were selected from among the previous ones, with the criteria that they should be framed in the geographical context of the Catalan city and that they entailed, materialised or drawn, the design of solutions for the improvement of living conditions. Thus, this compilation of projects framed in the same geographical, economic, and legal context allows us to contrast the limits and possibilities of the different strategies addressed.

3.2. Comparative Case Analysis Methodology

First of all, the socio-economic context of the city and its housing problems have been analysed and presented. Thanks to this prior examination, it is possible to establish the common panorama in which the case studies are framed. This prior knowledge of the particular casuistry of the city provides a context in which it is possible to theorise the different proposals together.

Subsequently, in the context of this publication, the interventions and debate around the Barcelona approaches that constitute case studies on the strategies of reuse in co-design and co-fabrication are collected. The questions and practices presented are from different natures, providing a broad and diverse view of this type of practice. The experiences of public and private or cooperative initiatives, which are the subject of this article, are presented below:

- Co-Hab-Raval project, funded by the Barcelona City Council and developed by two university research groups and a local NGO.
- Barcelona City Council and its *Pla de Barris* proposal, funded and developed by the local administration in collaboration with *Fundació Habitat 3*, *Fundació Família i Benestar Social*, *Impulsem*, and the architecture studio *La Boqueria*.
- MISMeC Master's degree from *Vallès* public School of Architecture which combines sustainability-based interventions by students with the active participation of neighbours and local authorities.
- *Arquitectes de Capçalera*, a teaching course in an Architectural degree and a Citizen Service Office, whose methodology brings together students, social agents, and users to improve the living conditions of the most vulnerable groups.
- The architecture studio *El Tinglado* and their experience in the El Carmel neighbourhood, a project funded by *Ömnium Cultural*, and materialised with a local association and the participation of the neighbourhood residents.
- MAKEA, an NGO that proposes a participatory process of co-design and co-manufacturing together with the Barcelona City Council within the *Pla de Barris Raval Sud* and *Gòtic Sud* jointly with young people from various neighbourhood associations.

Due to the great heterogeneity of the selected cases, it has been necessary to establish baseline information for each case. To this end, a description has been provided for each case that includes information regarding the location, the time of intervention, the participants involved, the initiative for the action, the main objectives in each case, the extent of the intervention, and the validation of outcomes. For each case, a table is provided that summarises the applicability of the initiative and the strategies followed to achieve its objectives.

This first approach to the case studies allows us to synthetically establish the particularities of each one of them, as well as the reasons that motivated the decision-making of the agents involved when determining the practices to be applied.

In the second level of analysis, once the individual projects have been described, a common comparative framework has been determined between the different practices established in the first analysis. In this case, the chosen parameters that allow comparison are the following:

- Agents involved. Agents involved in the experience are described, defining their sector (public, private, or academic). In addition, it is described if there has been an intervention of academia in the detection of the users' needs and if there has been active participation by them [59].
- Modalities of users' participation. It is described in detail what has been the degree of users' participation, including in the highest rungs of the participation ladder [60]. It is detected whether the practices analysed contain the following modalities of users' participation: training and local employment, detecting particular needs and capacities of neighbours, user participation in the design process, and strengthening neighbourhood and community relations to foster identity and a sense of belonging to the city. The budget of each project has been excluded, because despite all of them having, as *leitmotiv*, the use of the minimum resources, some of them were not executed and no real construction cost is available to be compared.
- Management of tangible and intangible resources. In order to identify to what extent, the proposals take advantage of the existing resources and represent a shift towards low energy consumption and circular economy, and to detect to what extent they affect ownership. The parameters to consider are if there has been reduced consumption of material resources or energy rehabilitation, if the self-construction has been assisted, if there has been an enhancement of architectural and intangible heritage, or if there has been a change of public ownership of the property.

In this way, it has been possible to show how similar issues have been tackled by means of different strategies, which has made it possible to observe the limits and opportunities provided in each case.

It is also worth bringing out the relationship between the strategies of reuse and self-construction, which in many cases are not independent concepts but often related, especially through the material or construction system, which is shown to be decisive and capable of defining some of the proposals. Although limited by their own character, both reuse and self-construction become invaluable resources with great potential for the future.

4. Different Approaches to Co-Design and Co-Fabrication in Barcelona

The following sections analyse individually the six methodologies studied in this article. The different approaches are intended to strengthen the relationship between architecture and community. From the authors' point of view, the practices addressed to face problems associated with residential buildings are particularly interesting because of their importance to alleviate the housing emergency/precariousness and their way to materialise tangible solutions adapted to their respective communities.

4.1. Co-Design and Co-Fabrication Raised by Co-Hab-Raval

This project was focused on *El Raval* neighbourhood in the district of *Ciutat Vella* in Barcelona. It is linked to the applied research project developed by the authors Co-Hab-Raval [8], where various micro-pilot projects were tested, capable of improving basic aspects of the common spaces of buildings.

The communities and residents of this neighbourhood were living in deficient living spaces, with insufficient space and lacking sanitation, ventilation, and natural lighting, without quality outdoor and/or indoor communal spaces, without lifts or accessibility conditions, and often in a situation of energy poverty. One of the main objectives was the involvement of the residents in each community to build the rehabilitation prototypes with the help or assistance of some of the neighbourhood's professionals and the researchers. These micro-projects had, as main axes, the improvement of: (1) habitability and healthiness, (2) safety, (3) resilience, (4) inclusion, (5) sustainability, and (6) healthiness.

As explained above, within Barcelona’s housing issues, *El Raval* neighbourhood is one of the most vulnerable in each structure. Added to this context of precariousness, there is a lack of response from public institutions [49].

As a result of this delay of a proper public response or assistance, the Co-Hab-Raval [8] project proposes accompanied co-manufacturing through the implementation of micro-projects arising from cooperation between researchers, specialists, vulnerable communities, local professionals, and local associations (Table 2). Although the project was funded by Barcelona City Council, its scope and impact are limited to solving the structural problems of the neighbourhood mentioned above, which is one of the reasons why the authors highlight this lack of institutional response. In this way, neighbours experience a change in their role, becoming active agents in the process of improving their habitat conditions. This not only makes the users the driving force for change in the community, but also strengthens the quarter’s networks and its sense of belonging. In this way, through the implementation of these micro-projects that were raised from the particular needs of each community, the project became an open system that can be adapted to other particular needs of different living units.

Table 2. Microprojects proposed by Co-HAB-Raval.

Co-HAB-Raval	
Applicability	Academic-practical exercises
Strategies	Public-private partnerships with local partners Renovation and use by vulnerable groups
	Detection of neighbours’ specific needs and capacities
	Users’ participation in the design process
	Implementation of low-cost micro-projects
	Strengthening neighbourhood and community relations to foster identity and sense of local belonging

Through the development of the multidisciplinary working groups, the designs were able to integrate these particular needs of each neighbourhood as well as the specific knowledge of each agent involved. At the same time, collaborative design approaches with residents for the management, maintenance, appropriation, transformation, and physical improvement of housing and common spaces were developed. The prototypes resulting from the co-design process were materialised after the participatory process (Figure 1). Since their implementation, the Oasi Urbà association was in charge of collecting the qualitative impressions of users, and so far, no disagreements with their use have been reported.

In addition, the project brings vulnerable residents closer to local associations and the local productive sector, thus strengthening self-management, the neighbourhood’s associative fabric, and mutual support.

An innovative aspect from a constructive point of view is the application of the principles of dry construction, recyclability, demountability, and the use of low-cost construction systems that were taken into account in the development of these micro-projects in order to facilitate their implementation and replicability. In Figure 2a, we can see the installation of a gazebo based on these construction principles, which offers a meeting and care space for the neighbours, as well as a refuge from the high summer temperatures in terms of energy poverty. Pergolas on the roof provide a shaded and ventilated space that improves comfort conditions in summer, decreasing the need for energy consumption for cooling. Figure 2b presents another micro-project which was the installation of a removable and non-permanent wooden covering for the staircases. This solution was intended to solve accessibility issues, together with the help of hinged pieces at the corners of the landing to allow the needy to rest when climbing the stairs.

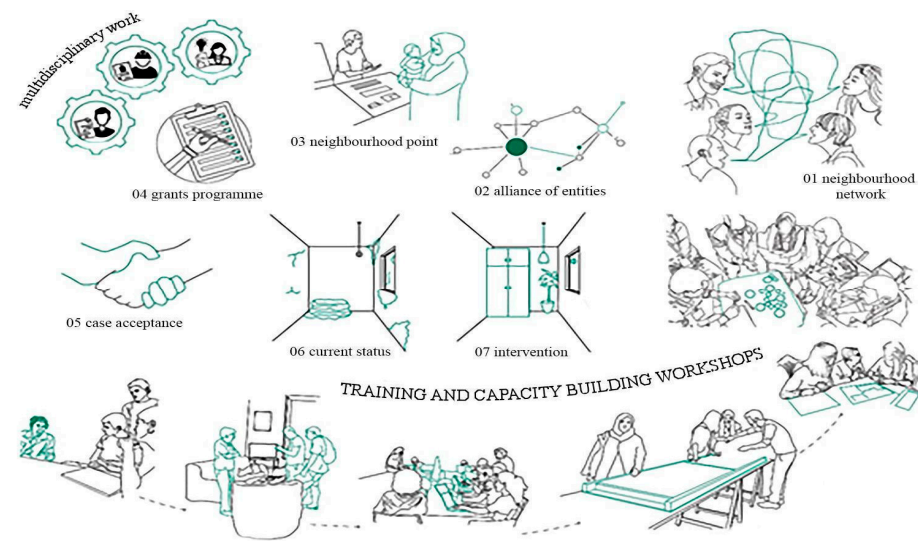


Figure 1. Participatory methodology proposed by the Oasi Urbà team [61].



Figure 2. Some of the micro-projects carried out in the framework of the project Co-Hab-Raval. (a) Picture of the gazebo element built with common and low-cost construction elements; (b) Picture of the rehabilitation of the staircases with plug-in wood elements [8].

The objective of this micro-project was the improvement of accessibility, especially for the elderly and thus favour their participation in daily activities. Light and ventilation deficiencies were remedied with the installation of grilles in the doorway and stairwell to promote air circulation and natural lighting throughout the vertical core. It is important to emphasise that these micro-projects were in themselves a test with the idea to check their future replicability.

Another innovative aspect of the project compared to other self-construction interventions that already exist in the city, as well as similar proposals such as those contained in the *Re-habilitación exprés para hogares vulnerables. Soluciones de bajo coste* [62], lies in the development of local and transversal working groups. The cluster was integrated by researchers and specialists, local manufacturers, associations, and residents in order to integrate into the prototypes the collective and transversal capacity of multiple agents with first-hand knowledge of:

1. The problems and needs of the neighbourhood.
2. The difficulties and opportunities for management and maintenance.

3. The quality and efficiency for standard solutions to be designed and applied in each specific case in the *El Raval* neighbourhood of Barcelona.

4.2. Practices in Barcelona as A Case Study. Policies and Practices Implemented by Barcelona City Council's *Pla de Barris* (Neighbourhood Plan) (2016–2020)

This project was a public-private collaboration between the Barcelona City Council through its *Pla de Barris* (2016–2020) and the owner of three dwellings. Thanks to this collaboration, it was possible to rehabilitate the apartments to allocate within them vulnerable people (specifically, homeless elderly people) through a 10-year concession (Table 3). On the basis of this agreement, the public administration was in charge of financing the whole process, including rehabilitating and taking the use of the flats for social benefit for 10 years in exchange. Thanks to this agreement, *Pla de Barris* promoted a training plan for long-term unemployed people in the neighbourhood who, in turn, participated in the rehabilitation works of the flats.

Table 3. Overview of the strategies outlined by *Pla de Barris*.

<i>Pla de Barris</i>	
Applicability	Public policies aimed at implementing new practices on certain conditions of vulnerability.
Strategies	Public-private partnership to promote housing renovation and use by vulnerable groups. Local training and employment plan. Users' participation in the design process.
	Strengthening neighbourhood and community relations to foster identity and sense of local belonging.

This project addressed the issue of access to housing, especially in the case of vulnerable groups such as the elderly homeless. At the same time, the project, thanks to the intervention of the administration together with local associations, used the initiative to tackle the problem of long-term unemployment in the neighbourhood through professional training courses. To this end and in detail, a one-month training course was organised for the 16 long-term unemployed people, aimed at rehabilitation and job reactivation. In the following five months, seven of these 16 people were hired for rehabilitation work. Meanwhile, the elderly people who would be the future inhabitants joined an accompaniment program with social agents that helped to shape their needs into the architectural project.

This public-private collaboration between the city council administration through the *Pla de Barris* and the owner of the dwellings was fundamental to carrying out this rehabilitation in an urban context, which, as has been said, is threatened by gentrification because of real estate speculation and tourist pressure. On the other hand, the involvement of several social agents from the neighbourhood and the architectural firm La Boquería was necessary to carry out the training courses at the construction site, the aim of which was to reintegrate into the labour market those people from the neighbourhood who were long-term unemployed. In parallel to this training, a support plan was drawn up with the future users to involve them in the design and decision-making process (Figure 3). La Boquería studio was in charge of designing the refurbishment projects for the three dwellings. The project stood out for the plurality of agents involved and the dialogue and collaboration between them, all decisive for the success of the initiative.



Figure 3. Practices implemented with the policies promoted by Barcelona City Council *Pla de Barris* (2016–2020). (a) Co-design process with users; (b) The building site as a technical-training space [49].

The achievements of the project can be evaluated in the figures of labour reinsertion obtained six months after the end of the project: of the 16 people who had received the training, 50% obtained a work contract. At the same time, it was possible to implement a methodology to provide decent housing for homeless elderly people.

We can see here how collaboration between administration and private property is possible and necessary to alleviate social inequalities related to access to affordable housing. In this way, the project manages to reintegrate people at risk of social exclusion and involve them in the decision-making process. In addition, the project manages to explore new ways of action born from the mix of agents involved. In this case, the training and participation of long-term unemployed people were achieved, generating an increment in their possibilities to reintegrate into the labour market.

4.3. MISMeC Master's Pedagogical Internships at the Vallès School of Architecture

In this case, a training proposal promoted by the Vallès School of Architecture is described (Table 4). The projects developed in this master's degree seek to restore the balance between social metabolic flows and the environment, through intervention in the built environment.

Table 4. Overview of the pedagogical strategies implemented by the MISMeC master's programme.

MISMeC Pedagogies	
Applicability	New pedagogies aimed at implementing new practices with an impact on increasing sustainability.
Strategies	Academic approach to the real cases. Reduction of resource consumption. Energy rehabilitation. Self-construction.

The main objective of this training proposal is based on changing the current linear social metabolism which is based on a linear system of infinite resource consumption within a finite environment. The sustainable approach put forward by MISMeC aims to change to a circular system of resource management, so that the flows of the social metabolism are no longer destructive to the environment and become in balance with it.

In order to carry out this paradigm shift through architecture, this pedagogical proposal focuses on the reuse of the built environment and participation between students, local entities, and users as key strategies to reduce the consumption of resources and the generation of waste. To this end, the methodology of the master's degree involves interviews with users and visits to homes to find out the real needs of the neighbourhood. The number of participants varies each year depending on the number of students and the

degree of involvement of the neighbours. Finally, students propose different intervention strategies in their projects that focus on reusing material resources and reducing energy consumption. The results of the students' proposals are generally shown to the neighbours and other agents involved in the process, however, due to the fact that they are academic works, none of them were materialised.

The project 'From the outside' (Figure 4) is an example of the change of perspective proposed by the MISMeC, in which the hypothesis of rehabilitation from the outside to reduce energy consumption is proposed, analysing its potential and limitations from the point of view of achieving greater performance with the lowest consumption of resources. In addition, the "From the inside" proposal seeks intervention from the user through self-rehabilitation. To this end, the proposal analyses the capacities and needs of each user and translates them into self-rehabilitation guides (Figure 5).

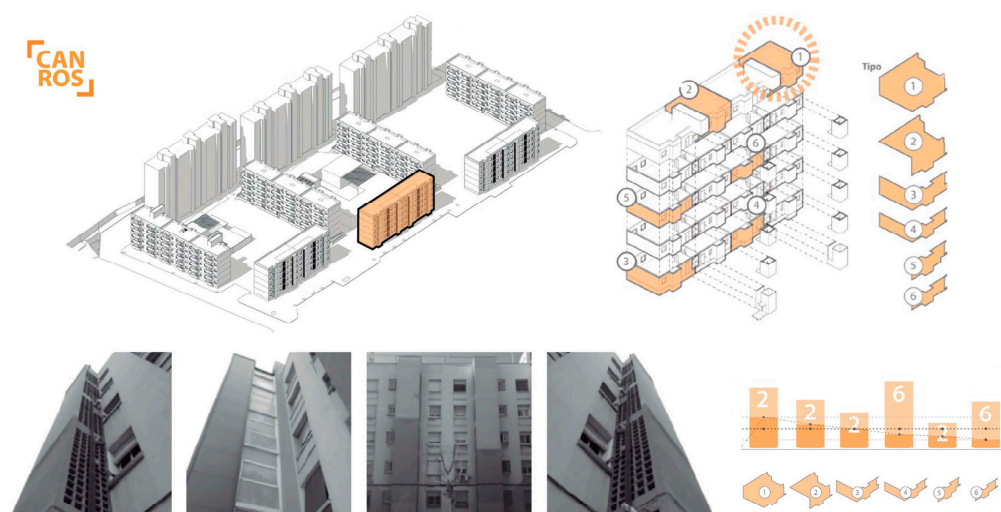


Figure 4. Project 'From the outside' [50].

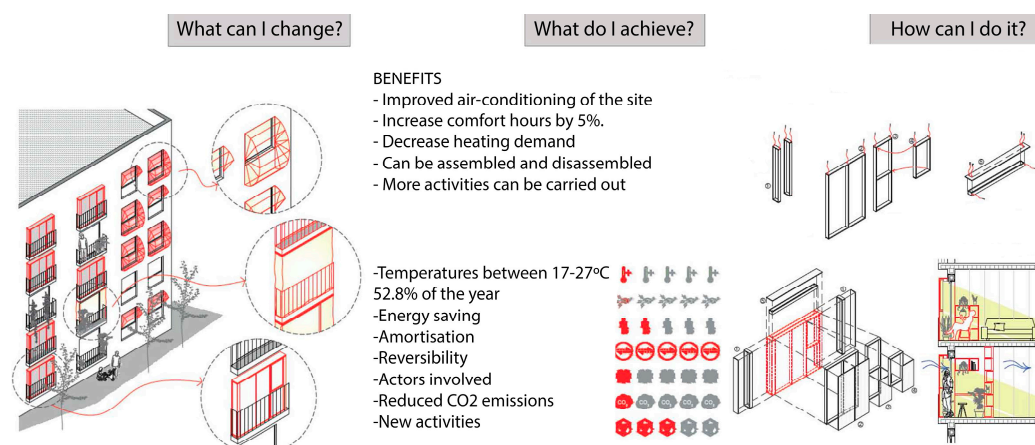


Figure 5. Self-rehabilitation guide provided in the project 'From the inside' [50].

Through these practices, it is possible to appreciate the new academic approach of MISMeC in which students are brought closer to the real problems of neighbourhoods from the sustainability point of view. At the same time, this approach towards the built environment introduces students to the circular economy consumption system and raises awareness about the main role that architecture plays in the use of resources, waste generation, and greenhouse gas emissions, issues that will be key to the students' future professional development.

4.4. *Arquitectes de Capçalera*

This section shows, once again, an innovative training proposal, in this case within the degree in Architecture at the Barcelona School of Architecture (ETSAB) and the implementation of a Citizen Service Office [63]. Here, the aim is to bring the academic world closer to the real problems of users through the implementation of participatory and consensual processes between students, users, and neighbourhood organisations, from the first level of analysis to the final proposal.

To carry out these projects, *Arquitectes de Capçalera* (AC) generates a participatory process in which students, neighbours, and the public administration are involved. This trinomial is essential to give viability to the academic proposals. This participatory approach favours the diagnosis of neighbourhood needs while empowering users by making them active agents in the process of change, which generates a greater sense of attachment and belonging.

The proposals are developed in vulnerable urban contexts threatened by real estate speculation and gentrification in the Metropolitan Area of Barcelona. The aim of them is to detect the specific shortcomings and threats of each neighbourhood and intervene to improve the living conditions of its residents, always from a participatory and inclusive approach.

An example of this working procedure was the Lancaster building, located in the *El Raval* neighbourhood. In this case, the strategy employed (Table 5) was the implementation of micro-projects developed with the materials available due to the lack of budget and based on the particular skills of the neighbours to achieve the technical possibilities of the rehabilitation of the building.

Table 5. Overview of the strategies proposed by *Arquitectes de Capçalera*.

<i>Arquitectes de Capçalera</i>	
Applicability	Academic-practical exercises.
Strategies	Trinomial public administration, private entities, and academia.
	Detecting neighbours’ specific needs and capacities.
	Self-construction.
	Enhancement of architectural and intangible heritage.
	Change of public ownership of the property.

The Lancaster building was previously abandoned and occupied by a group of citizens to develop a project for migrant single mothers. Complete rehabilitation was not possible and in 2015 the apartments inside were in deficient housing conditions. One of the users contacted the Citizen Service Office led by AC and an assisted rehabilitation project, together with a teaching course of fifth grade in architecture, was initiated [63].

To this end, AC, together with the students, invited the other users of the building to participate in the project from the beginning. The analysis phase allowed the students to map the needs and skills of the inhabitants through working groups [33]. After that, the micro-projects proposed by the students were given to the neighbours in the form of worksheets to facilitate their understanding and dissemination. The micro-projects, instead of a single large intervention, were planned as multiple small-scale interventions to make it possible for the neighbours to execute the projects, prioritizing the needs and budget available at each moment. Their technical office provided detailed instructions for carrying them out. Its implementation included the improvement of natural light and ventilation, waterproofing of the roof, and the opening of a window on the first floor to improve hygienic conditions, etc. [63].

This participatory process was successful in the short term, as it generated cohesion among the residents of the building and changed the students’ perspective of their role as architects. The interventions developed by the students together with neighbours increased the confidence in the project and increased the sense of belonging and responsibility in all

of them [63]. However, in the long term, the building was affected by the PMU (Urban Improvement Plan) and was eventually demolished for the construction of a new building. The families were rehoused in social apartments in the city [33].

Another project presented using the same methodology, the Can60 building, located on *Carrer Riereta* in the *El Raval* neighbourhood, was threatened by an investment group that wanted to demolish the building in order to build luxury apartments [33]. In this case, the students worked with the neighbours and the associative network of the area, in order to enhance both the built and the intangible heritage associated with the building (Figure 6). In this case, the proposal was more focused on convincing the municipal government of the need to preserve the building, through collaborative mappings that would show the importance of the building for the identity of the surroundings. In this sense, the proposal was successful, as the building became public property in 2016, however, seven years later, the building is still awaiting rehabilitation by the public administration.



Figure 6. Citizens' and students' mobilisations to save the Can60 building [52].

Through this methodology, students approached the most urgent needs of vulnerable contexts and have been prepared to identify and intervene in them. At the same time, this rapprochement between the academy and the most immediate realities favours the profession to integrate participatory processes, generating more diverse and inclusive architecture. At the same time, it contributes to the empowerment of the community by turning the user into an active agent and to the idea of having architecture and specifically inhabited housing rehabilitation as a public service.

4.5. Self-Construction Practices in the Carmel Neighbourhood of Barcelona Managed by El Tinglado

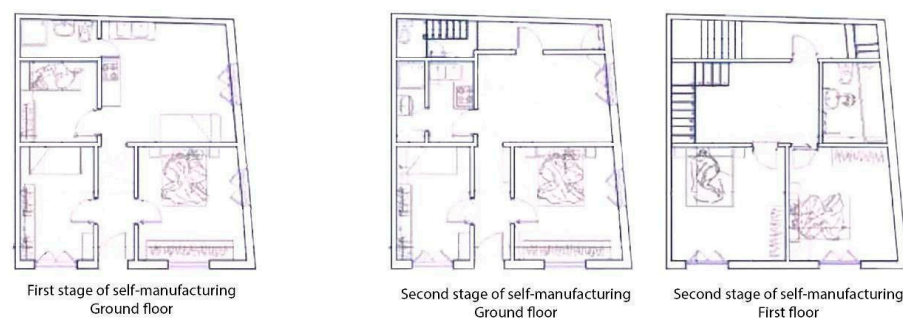
This project is based on the documentation of the self-construction experiences carried out by *El Carmel* residents as a way of collecting and valuing the neighbourhood's memory and identity (Table 6). This has been accomplished through a series of interviews and a redrawing process. All this enabled the generation of informative material that, through guided walks, brings citizens closer to the history of struggle and self-construction in this area.

Table 6. Self-manufacturing practices in the *El Carmel* neighborhood.

<i>El Tinglado</i>	
Applicability	Diffusion and education.
Strategies	Neighborhood self-management for dignified housing. Enhancing the value of neighborhood struggles and popular knowledge. Enhancing the value of anonymous built heritage in face of gentrification.

El Carmel was built in the last half of the 20th Century informally. Self-construction was the response to the lack of intervention by public administrations and the lack of housing during the growth of the population in the city in the 1950s and 1960s. The informational project proposed by *El Tinglado* in collaboration with Omnium Cultural sought to dignify and disseminate this process of empowerment that has given rise to the consolidated neighborhood that it is today, currently also at risk due to the pressing process of gentrification.

To carry out this documentation work, the project conducted interviews with three families from the neighborhood in order to collect their direct testimonies. These conversations aimed to highlight the value of popular knowledge and their experiences during the process of claiming decent housing. In addition, this collection of information was accompanied by a drawing of the dwellings (Figure 7), with the aim of recording the different phases of the process of growth and evolution of the dwelling. As can be seen in Figure 7, the house has gained floors in height over the years, which has modified its initial spatial configuration, showing the self-built dwelling as a living entity in constant change and evolution.

**Figure 7.** Evolution of a self-constructed apartment [54].

Through this project, we can appreciate the autonomy that self-built housing provides and its adaptability to the needs of families over time. In addition, this case shows how the phenomenon of self-construction does not start from individuality but is part of a collective and intergenerational consensual process that transcends the scale of the house to the scale of the neighborhood. The documentary work of this project makes it possible to incorporate self-built housing into the collective imagination as part of the city's built heritage and community identity. At the same time, this compilation highlights the capacity for self-management and the importance of the associative fabric in the face of the lack of response from the administration. This study was carried out only for the *El Carmel* neighbourhood, but it would be necessary to extend it to other areas of self-building in Barcelona to have a broader view of this phenomenon in the city.

4.6. Reuse and Self-Construction Practices Promoted by MAKEA

The philosophy that was driven by MAKEA brought users closer to the awareness of reuse possibilities while empowering them by the provision of new construction skills to achieve technical solutions to their needs. An example of this approach was the collaboration project between Kn60Lab (a youth dynamization project promoted by the Barcelona City Council within the *Pla de Barris* in *El Raval Sud* and *Gòtic Sud*) and MAKEA presented

here. In this case, the proposal (Table 7) consisted of the design and construction of furniture for a youth centre located in the *El Raval* neighbourhood of Barcelona, using the waste available in the area as construction materials. In this way, the young people of the area not only learned how to handle tools and design their own furniture but also how to reuse waste materials.

Table 7. Overview of the strategies put forward by MAKEA.

MAKEA	
Applicability	Direct practice with users.
Strategies	Citizen participation to raise awareness of the need to reuse and optimise resources and, in turn, generate community shared knowledge. Facilitating interaction between public and private institutions. Self-construction. Generate objects through a co-design process with users that can be easily adaptable and replicable in the future.
	Use of waste materials to reduce resource consumption.

To this end, the project was organized into three workshops held over three weeks on *La Rambla del Raval*. Participation in this workshop was open so that any interested person passing through the street could collaborate, however, the group dynamics and training sessions sought to create a link with the project in order to encourage the continuity of the participants in the project. After the end of this one-off collaboration between MAKEA and KN60lab, the furniture was made available to KN60lab for future uses to be organized.

This project highlights the potential of waste as a new building material, with the aim of reducing the city's waste production and emissions. At the same time, it highlights the difficulty for citizens to access these new resources due to the lack of controlled management of this 'waste' by the administration, which entails a great misuse of material.

The project arose from the participation of the public administration, through *Pla de Barris*, together with the youth associations of the neighbourhood. The participation of young people in this furniture co-design and co-manufacture process was based on the desire to create a module that could be easily replicated and adapted to different uses, thus extending their life cycle. In turn, as shown in Figure 8, this manufacturing process was carried out in the public space, trying to involve the whole neighbourhood during the evolution of the project.



Figure 8. Kn60Lab's furniture co-manufacturing process [56].

Thanks to the direct implication of users in the design and manufacturing process, the project succeeded in raising awareness among young people of the need and potential

of reuse, as well as making them aware of the need to reduce waste generation. On the other hand, this experience empowered users by making them participants in the process of transforming spaces with their own skills.

5. Discussion

The practical proposals analysed and compared in this study show different ways to address assisted self-manufacturing, reuse, and co-design. Some of the tools presented are provided in order to overcome the impediments that hinder the qualitative and quantitative expansion of experiences that are still restricted to informality or experimental research-action projects.

Experiences and practices presented in this article are of a different nature, providing a broad and diverse approach from public, private, and mostly cooperative, initiatives. Barcelona City Council and its *Pla de Barris* proposal, which solves specific housing problems in a situation of residential vulnerability; the *Vallès* School of Architecture and its MISMeC master's degree or *Arquitectes de Capçalera* in the Barcelona School of Architecture and its Citizens Office Service, in which it can be seen how teaching and practice can be approached from the perspective of the CE, architectural reuse and social metabolism; and the *Tinglado* or the MAKEA approaches and their 'bottom up' methodology, show us proven practices in which architecture promotes the regeneration and reuse of certain spaces to improve the conditions of everyday life.

In all of them, there is a constant, which is the collaboration of diverse agents from different fields and disciplines, together with the social fabric. In addition, there is an awareness of the temporary nature of users proposing interventions that can house changes throughout their life and could be able to serve society. At the same time, the practices analysed consider the built environment as a stock of resources giving the construction elements a much longer life cycle than only one simple building.

In Table 8, the analysed methodologies are compared, taking into account the agents involved in each case, the level and type of users' participation, and the management of existing resources. In the context of this publication, the interventions and debates around the Barcelona approaches presented are different in terms of their scale of action, budget, scope, and geographical proximity.

The practical approaches presented to co-design and co-manufacturing in architectural reuse processes within the same legal context applied in the city of Barcelona have particularities at different scales in each case. Nevertheless, it allowed a comparative analytical framework to be established in this paper to identify opportunities and limitations of co-design and co-manufacturing in a South European city with difficulties in the access of affordable housing. The results obtained highlight the importance of involving multiple agents and experts in order to provide renewal solutions that do not end up benefiting the real estate sector but those most in need.

All the cases show their will to consolidate collaboration networks, as well as to promote the professionalisation and training of residents, small operators and professionals in the sector, and other local groups. All of them display a growing interest in innovative techniques and processes that are increasingly in demand (bio-construction, dry construction, industrial design with recycled materials, etc.).

It is also worth highlighting the relationship between the strategies of reuse and self-construction, which in many cases are not independent concepts and are often related, especially through the material or construction system, which is shown to be decisive and capable of defining some of the proposals. Although limited by their own character, both reuse and self-construction become invaluable resources with great potential for the future.

Finally, the proximity between researchers, technicians, and users, a trinomial that in a housing context is demonstrated as a positive factor that guarantees that certain decisions are taken in the most appropriate way. In addition, it is a procedure that also brings us closer to the idea of assisted rehabilitation, in which we must not forget the importance of specific knowledge of rehabilitation techniques and intervention on existing buildings.

Table 8. Comparison of the different practices.

	Strategies	Case Studies					
		Co-HAB-Raval	Pla de Barris	MISMeC Pedagogies	Arquitectes de Capçalera	El Tinglado	MAKEA
Agents involved	Public-private partnerships	■	■		■		■
	Trinomial public administration, private entities and academia	■		■	■		■
	Academic approach to the real needs of the field of study	■		■	■		
	Users' participation	■	■	■	■	■	■
Modalities of user participation	Training and local employment	■	■		■		■
	Detecting particular needs and capacities of neighbours				■	■	■
	User participation in the design process	■	■				■
	Strengthening neighbourhood and community relations to foster identity and a sense of belonging to the community	■	■		■	■	■
Management of tangible and intangible resources	Reduced consumption of material resources			■			■
	Energy rehabilitation			■			
	Assisted self-construction			■	■		■
	Enhancement of architectural and intangible heritage				■	■	
	Change of public ownership of the property.				■		

The strategies used by each case study are marked with bullets (■).

6. Conclusions

The case studies presented aimed to overcome the usual methodological difficulties and cross limits by bringing architecture closer to the final beneficiaries. The precariousness of housing and the urgent needs that arise from the situations detected in Barcelona, as is also the case in many other parts of the Metropolitan Area, frame these processes. The methodologies presented, have as their starting point, the experience of the different architectural approaches together with the type of entities involved in each case, as well as the specific disciplinary knowledge of the manufacturers.

In the case studies analysed in this paper, there is a constant, which is the collaboration of diverse agents from different fields and disciplines (technicians, architects, social scientists, representatives of the administration) altogether with actors from the social fabric such as concerned neighbours and representatives of entity networks and local cooperatives. In addition, there is an awareness of the temporary nature of uses and buildings. These become resources with a much longer useful life that could be foreseen before their implementation and which, with appropriate interventions, can house changing uses throughout their life and thus be able to serve society.

The housing emergency in the city of Barcelona urges us to take measures to alleviate at least unhealthy and poverty conditions. All the measures that have been studied are considered positive, despite the fact that no quantitative validation is foreseen in the short term. However, they are considered important and valuable because they show mechanisms and new approaches of architecture to work in the outskirts of the real estate market rules and to understand the real problems of people inhabiting the contemporary city.

The main limitations of those practices are considered to be the following three in particular:

1. Firstly, as stated at the beginning, Barcelona's residential stock has a low supply of public housing [33]. This fact makes it very susceptible to gentrification processes in renovation interventions because of the rules of the neoliberal real estate market.

As shown by the DESC Observatory [35], despite the lack of existing public housing in Barcelona compared to other European cities, the public agency operates by counteracting the private large holders. As their report shows, the rise of large landlords in the city in the aftermath of the global financial crisis has been very detrimental to the availability of affordable housing. That is why it allows us to affirm that the increase in public housing, the increase in cooperative housing, and the regulation of rental prices, would be essential measures to reduce the effects of gentrification in the reuse processes.

2. Secondly, in order to carry out these practices, it is necessary for users to have at least a network of local associative support. For this, it requires a certain formal establishment and time that the most vulnerable and marginal strata of society lack.

Plans such as the Pilot Plan for a Basic Income in Catalonia [64] demonstrate the importance of publicly guaranteeing the material conditions for existence. In this sense, it is shown that it is necessary to offer these guarantees without them having to be requested, since the long and tedious application processes for aid separate the most vulnerable strata of society. In this sense, the practices presented are dependent on public funding and/or neighbourhood support networks in order to be carried out. As has been shown, this makes it difficult for the most vulnerable citizens to access them.

3. Finally, these practices are dependent on public funding and may be susceptible to political instrumentalization or depend on the political sensitivities of each moment.

In addition to what was highlighted in the second point, the dependence on public funding of these types of practices, especially in a market as stressed as that of Barcelona, from our point of view places these practices on the outskirts of the architectural action. The processes for the construction or renovation of houses have longer times than the municipal political cycles. This can leave proposals like the ones presented halfway.

From our point of view, the right to housing and the right to architecture, as shown by as shown by the case studies presented, should be part of our basic framework of coexistence.

Author Contributions: Conceptualization, M.D.-R. and C.C.; methodology, M.D.-R. and C.C.; validation, M.D.-R. and C.C.; formal analysis, M.D.-R. and C.C.; investigation, M.D.-R.; resources, P.J.R.M.; data curation, M.D.-R.; writing—original draft preparation, M.D.-R., A.V.-C. and C.C.; writing—review and editing, G.P., S.V.-G., A.V.-C., M.D.-R. and C.C.; visualization, A.V.-C.; supervision, S.V.-G. and P.J.R.M.; project administration, S.V.-G.; funding acquisition, P.J.R.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Bit Habitat—Ajuntament de Barcelona, grant number CP2020 0193.

Acknowledgments: We would like to give a special thanks to the participants in the debate, Andreu Meixide, Santiago Ibarra, Mariana Palumbo, Satiago Cirugeda, Ibon Bilbao, Josep Bohigas, Sandra Bestraten, Zeltia González Blanco, Lautaro Malnatti, Danny Willis, Cristina Poza, Alberto Flores and Alberto Gualdo Zabaleta for sharing their experiences and knowledge with us. We would also like to thank the Centre for Research on Architecture, Society & the Built Environment—ETH Wohnforum (Department of Architecture, ETH Zurich), the Barcelona City Council and the BitHabitat Foundation for their support and trust. Finally, we would like to thank Issac Colin and Albert comas (REARQ), Victoria Tous, Júlia Brull and Helena López (Oasiurbà) and Montserrat Bosch, Joan Ramon Rosell and Almudena Pérez (GICITED) for their work and dedication.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. New European Bauhaus Compass. Available online: https://new-european-bauhaus.europa.eu/use-compass_en (accessed on 6 April 2023).
2. Munaro, M.R.; Tavares, S.F.; Bragança, L. Towards Circular and More Sustainable Buildings: A Systematic Literature Review on the Circular Economy in the Built Environment. *J. Clean. Prod.* **2020**, *260*, 121134. [CrossRef]
3. Barberis, V. *Sustainable & Re-Use of Spaces & Buildings*; Urban Agenda of the EU: Brussels, Belgium, 2020.
4. Estrategia Española de Economía Circular ESPAÑA CIRCULAR 2030 Por Un #FuturoSostenible. Available online: https://www.miteco.gob.es/images/es/espanacircular2030_def1_tcm30-509532_mod_tcm30-509532.pdf (accessed on 21 April 2023).
5. Domènech-Rodríguez, M.; López López, D. The Idea of Cultural Heritage in Border Neighbourhoods of West-Berlin in 1976–1978. *Heritage* **2023**, *6*, 2614–2632. [CrossRef]
6. ICOMOS. The Declaration of Amsterdam 1975. Available online: <https://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/169-the-declaration-of-amsterdam> (accessed on 6 April 2023).
7. Debate Final Jornadas de Debate. Co-Diseño y Co-Fabricación En La Arquitectura. Zonavideo UPC. Available online: <https://zonavideo.upc.edu/video/60e440cfa5ad8c1a69589891> (accessed on 15 February 2023).
8. Co-Hab-Raval. Available online: <https://cohabraval.com/> (accessed on 10 February 2023).
9. Urban Agenda of the EU. *Mainstreaming Circular Economy as an Eligible Area into the Post 2020 Cohesion Policy and Corresponding Funds*; Urban Agenda of the EU: Brussels, Belgium, 2019.
10. UN_Habitat. *Ericsson Mixed Reality for Public Participation in Urban and Public Space Design*; UN_Habitat: Nairobi, Kenya, 2019.
11. Próximas Etapas Para Un Futuro Europeo Sostenible. Acción Europea Para La Sostenibilidad. *European Commission*. Available online: <https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=CELEX%3A52016DC0739> (accessed on 21 April 2023).
12. Ajuntament de Barcelona. *L'Agenda 2030 de Barcelona Fites i Indicadors Clau Informe Presentat al Plenari de l'Ajuntament de Barcelona Octubre de 2020*; Ajuntament de Barcelona: Barcelona, Spain, 2020.
13. Mine, T.Z. Adaptive Re-Use of Monuments “Restoring Religious Buildings with Different Uses. *J. Cult. Herit.* **2013**, *14*, S14–S19. [CrossRef]
14. Fuster Morell, M.; Senabre Hidalgo, E. Co-Creation Applied to Public Policy: A Case Study on Collaborative Policies for the Platform Economy in the City of Barcelona. *CoDesign* **2022**, *18*, 378–397. [CrossRef]
15. Bellamy, R.; Palumbo, A. *From Government to Governance*; Routledge Taylor & Amp: New York, NY, USA, 2017; pp. 1–506.
16. Pessoa Marcilla, M. La Ciudad (Informal). *QRU Quad. Recer. Urban.* **2020**, 4–13. [CrossRef]
17. Cities Alliance. Available online: <https://www.citiesalliance.org/how-we-work/global-programmes/global-programme-informality/overview> (accessed on 10 February 2023).
18. Cisneros, P.; José Gómez Alfonso Eva María Álvarez Isidro, C. *Estrategias de Participación En La Arquitectura Reciente: Algunos Casos de Estudio*; Universitat Politècnica de València: Valencia, Spain, 2020.
19. Lucchi, E.; Delera, A.C. Enhancing the Historic Public Social Housing through a User-Centered Design-Driven Approach. *Buildings* **2020**, *10*, 159. [CrossRef]
20. Geddes, P. *Cities in Evolution; an Introduction to the Town Planning Movement and to the Study of Civics*; Franklin Classics Trade Press: London, UK, 1915.
21. Turner, J.F.C.; Fichter, R. Freedom to Build: Dweller Control of the Housing Process. *Urban Stud.* **1972**, *11*, 301.

22. Golda-Pongratz, K.; Oyon, J.L.; Zimmermann, V. *Autoconstrucción: Por Una Autonomía Del Habitar. Escritos de John Turner Sobre Vivienda, Urbanismo, Autoconstrucción y Holismo*; Pepitas de Calabaza: Madrid, Spain, 2018; Volume 352, pp. 1065–1067.
23. Mehaffy, W.M.; Kryazheva, Y.; Rudd, A.; Salingaros, N.A.; Gren, A.; Mouzon, S.; Petrella, L.; Porta, S.; Qamar, L.; Rofè, Y. *A New Pattern Language for Growing Regions: Places, Networks, Processes*; Sustasis Press in Association with Centre for the Future of Places; KTH Royal Institute of Technology: Stockholm, Sweden, 2020.
24. García Ramírez, W. Arquitectura Participativa: Las Formas de Lo Esencial. *Rev. De Arquít.* **2012**, *14*, 4–11.
25. Bredenoord, J.; van Lindert, P. Pro-Poor Housing Policies: Rethinking the Potential of Assisted Self-Help Housing. *Habitat Int.* **2010**, *34*, 278–287. [[CrossRef](#)]
26. Rabbiosi, C. Urban Regeneration ‘from the Bottom Up’. *City* **2017**, *20*, 832–844. [[CrossRef](#)]
27. Stein, A. *A Critical Review of the Main Approaches to Selfhelp Housing Programmes*; University College London: London, UK, 1991.
28. Webb, R.; Bai, X.; Smith, M.S.; Costanza, R.; Griggs, D.; Moglia, M.; Neuman, M.; Newman, P.; Newton, P.; Norman, B.; et al. Sustainable Urban Systems: Co-Design and Framing for Transformation. *Ambio* **2018**, *47*, 57–77. [[CrossRef](#)] [[PubMed](#)]
29. Johnson, L. *The Community Planning Handbook: How People Can Shape Their Cities, Towns and Villages in Any Part of the World*; Routledge Taylor & Amp: New York, NY, USA, 2016; Volume 53, pp. 263–264. [[CrossRef](#)]
30. Sirvent, M.T.; Rigal, L. La Investigación Acción Participativa Como Un Modo de Hacer Ciencia de Lo Social. Available online: https://cdn.designa.mx/CREFAL/revistas-decisio/decisio38_saber2.pdf (accessed on 21 April 2023).
31. Bosone, M.; Ciampa, F. Human-Centred Indicators (HCI) to Regenerate Vulnerable Cultural Heritage and Landscape towards a Circular City: From the Bronx (NY) to Ercolano (IT). *Sustainability* **2021**, *13*, 5505. [[CrossRef](#)]
32. LopezDeAsiain, M.; Díaz-García, V. The Importance of the Participatory Dimension in Urban Resilience Improvement Processes. *Sustainability* **2020**, *12*, 7305. [[CrossRef](#)]
33. Avilla, R.; Phd, R.; Practice, B. Collaborative Architecture Barcelona the Architect as Enabler. Ph.D. Thesis, Royal College of Art, London, UK, 2022.
34. García-Almirall, P.; Gutiérrez, B. *Modelos de Política de Vivienda Municipal*; Universitat Politècnica Catalunya: Barcelona, Spain, 2016; Volume 9.
35. Emergencia Habitacional En El Estado Español: La Crisis de Las Ejecuciones Hipotecarias y Los Desalojos Desde Una Perspectiva de Derechos Humanos | Observatori DESC. Available online: <https://observatoridesc.org/es/node/4302> (accessed on 10 February 2023).
36. Ajuntament de Barcelona; Agència d’energia de Barcelona; Barcelona pel Medi Ambient. *Diagnosi Energètica de Barcelona*; Ajuntament de Barcelona: Barcelona, Spain, 2013.
37. Vima-Grau, S.; Cornadó, C.; Garcia-Almirall, P. Socio-Spatial Analysis of the Vulnerable Urban Fabric in the City of Barcelona. *VITRUVIO Int. J. Archit. Technol. Sustain.* **2019**, *4*, 75–89. [[CrossRef](#)]
38. Garcia-Almirall, P.; Cornadó, C.; Vima-Grau, S.; Blanco Álvarez, A.; Bosch, P.; Pujadas Álvarez, P. Residential Vulnerability of Barcelona: Methodology Integrating Multi-Criteria Evaluation Systems and Geographic Information Systems. *Sustainability* **2021**, *13*, 13659. [[CrossRef](#)]
39. Observatori Metropolità de l’Habitatge de Barcelona. *Estrategias y Potencial de Rehabilitación. Estado Físico y Potencial de Mejora Del Parque de Viviendas de Barcelona*; Observatori Metropolità de l’Habitatge de Barcelona: Barcelona, Spain, 2022.
40. Cornadó, C.; Garcia-Almirall, P.; Casals, J.; Caballero, A. La Cuestión de La Infravivienda, Un Estudio de Caso En La Ciudad de Barcelona. *Arquitecto* **2021**, *17*, 13–22. [[CrossRef](#)]
41. Cornadó Bardón, C.; Vima Grau, S.; Martín García, E. Intervenciones de Mejora de Accesibilidad En Los Edificios Históricos de Barcelona. In Proceedings of the XIII CTV 2019 Proceedings: XIII International Conference on Virtual City and Territory: “Challenges and Paradigms of the Contemporary City”: UPC, Barcelona, Spain, 2–4 October 2019. [[CrossRef](#)]
42. Tirado-Herrero, S. *Indicadores Municipales de Pobreza Energética En La Ciudad de Barcelona Smart Home Control: Exploring the Potential for Enabling Technologies in Vulnerable and Disengaged Households View Project Energy Vulnerability and Urban Transitions in Europe (EVALUATE) View Project*; Ajuntament de Barcelona: Barcelona, Spain, 2018.
43. Edad Por Grandes Grupos de Edad. 1 Enero 2021. De La Población Por Distritos. Available online: https://ajuntament.barcelona.cat/estadistica/castella/Estadistiques_per_temes/Poblacio_i_demografia/Poblacio/Padro_municipal_habitants/a2021/edat/edatg02.htm (accessed on 10 February 2023).
44. Esperanza de Vida al Nacer Por Distritos y Sexo. 2016. Available online: <https://ajuntament.barcelona.cat/estadistica/castella/Anuaris/Anuaris/anuari19/cap02/C020515.htm> (accessed on 10 February 2023).
45. Oficina Municipal de Dades del Ajuntament de Barcelona Distribució Territorial de La Renda Familiar Disponible per Càpita a Barcelona. 2017. Available online: https://ajuntament.barcelona.cat/barcelonaeconomia/sites/default/files/RFD_2017_BCN.pdf (accessed on 21 April 2023).
46. Privació Material Severa (PMS), per Sexe, Districtes i Grups d’edat. Available online: https://ajuntament.barcelona.cat/estadistica/catala/Estadistiques_per_temes/Poblacio_i_demografia/Poblacio/Enquesta_sociodemografica/esd2017/persones/taxes/PMS.htm (accessed on 10 February 2023).
47. Atur Registrat. Per Durada de l’Atur. Any 2021. Available online: https://ajuntament.barcelona.cat/estadistica/catala/Estadistiques_per_temes/Treball_i_teixit_productiu/Treball/Atur_registrat/durada/barris/anys/a2021/index.htm (accessed on 10 February 2023).

48. Salaris Mitjans Dels Residents de Barcelona per Districte i Sexe. 2019. Available online: https://ajuntament.barcelona.cat/estadistica/catala/Estadistiques_per_temes/Treball_i_teixit_productiu/Treball/Salaris/a2019/C1006080.htm (accessed on 15 February 2023).
49. Zonavideo UPC—Pla de Barris. Ajuntament de Barcelona. Available online: <https://zonavideo.upc.edu/video/60e2c1c6a5ad8c14ed2f85b5> (accessed on 5 April 2023).
50. Zonavideo UPC—MISMeC. Experiencias Docentes. Available online: <https://zonavideo.upc.edu/video/60e2d26aa5ad8c150d176414> (accessed on 5 April 2023).
51. Zonavideo UPC—Recetas Urbanas. Available online: <https://zonavideo.upc.edu/video/60e2da43a5ad8c150d17643b> (accessed on 5 April 2023).
52. Zonavideo UPC—Arquitectos de Cabecera. Available online: <https://zonavideo.upc.edu/video/60e2f66da5ad8c172f31e067> (accessed on 5 April 2023).
53. Zonavideo UPC—Proceso de Co-Diseño y Construcción de Vivienda de Bajo Coste Sostenible En El Norte de Kenia. Available online: <https://zonavideo.upc.edu/video/60e33597a5ad8c172f31e086> (accessed on 5 April 2023).
54. Zonavideo UPC—Space Saloon. Available online: <https://zonavideo.upc.edu/video/60e40e15a5ad8c17f84243a8> (accessed on 5 April 2023).
55. Zonavideo UPC—Procesos de Autoconstrucción En El Barrio Del Carmel, Barcelona. Available online: <https://zonavideo.upc.edu/video/60e41540a5ad8c18f55dc12b> (accessed on 5 April 2023).
56. Zonavideo UPC—Construïm-Nos! Available online: <https://zonavideo.upc.edu/video/60e424e2a5ad8c19b8160e17> (accessed on 5 April 2023).
57. Zonavideo UPC—REEhabilitant El Raval. Propuestas de Autogestión En Rehabilitación Energética de Hogares Vulnerables. Available online: <https://zonavideo.upc.edu/video/60e42e2ca5ad8c1a492a6b61> (accessed on 5 April 2023).
58. Zonavideo UPC—Programa de Mejoramiento de Vivienda Por Autogestión Barrio Mugica, Bs. As, Argentina. Available online: <https://zonavideo.upc.edu/video/60e439ffa5ad8c1a492a6b70> (accessed on 5 April 2023).
59. Javier, V.; García, D. The Case of the District of La Isleta. *Kult Ur* **2017**, *4*, 191–208. [CrossRef]
60. Arnstein, S.R. A Ladder of Citizen Participation. *J. Am. Plan. Assoc.* **1969**, *35*, 216–224. [CrossRef]
61. Oasiurba. Available online: <https://oasiurba.org/> (accessed on 10 February 2023).
62. Luxán García de Diego, M. *Re-Habilitación Exprés Para Hogares Vulnerables: Soluciones de Bajo Coste*; Fundación Gas Natural Fenosa: Madrid, Spain, 2017; ISBN 9788469746288.
63. Arquitectes de Capçalera's Web Page. Available online: <https://arquitectosdecabecera.org/portfolio/lancaster/#1585699338302-2a2a69b2-4f67> (accessed on 5 April 2023).
64. Pilot Plan for a Basic Income in Catalonia. Available online: https://presidencia.gencat.cat/es/ambits_d_actuacio/renda-basica-universal/ (accessed on 20 April 2023).

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.