

THE ENABLER ARCHITECT: TOWARDS A FRAMEWORK FOR
PARTICIPATION IN SOCIAL HOUSING

A Dissertation

by

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ABSTRACT

In Latin America, social housing refers to low-income housing projects provided or subsidized by the state. This dissertation explores an approach for the design and conception of social housing incorporating open building, self-help, and participatory design applied to this geographical context. Moreover, it addresses the current role of the architect in the field. The study developed a theoretical analysis using two research methods; logical argumentation and case studies. Four representative projects from architects that have globally impacted the housing discourse serve as case studies for investigation: Maison Dom-Ino (1914) and Quartiers Modernes Frugès (1926), by Le Corbusier; Villaggio Matteotti (1974), by Giancarlo de Carlo, and Quinta Monroy (2003), by Alejandro Aravena. The selection of the architects and their projects observed their influence on critical changes in social housing discourse. These changes occurred approximately every thirty years under a hundred and six-year time frame, from 1914 to 2020. These architects appear in literature as important figures whose ideas, theories, and projects historically influenced social housing production in Latin America.

The case studies' examination followed two structured phases. Phase one focused on constructing the “macro” picture of each project, creating a matrix of categories and distributing the evidence amongst them, investigating the following aspects: historical context, site context, and architectural theory. Phase two concentrated on composing the “micro” picture: developing a project analysis and evaluation of architectural drawings and other artifacts through a soft & hard scale system, generating data displays that measured each case study's performance under a participation spectrum.

Findings show the frame as a persistent element amongst the case studies that can serve as a vessel encompassing open building, self-help, and participatory design.

Furthermore, the results suggest that architects must act as enablers, users as collaborators, and the frame as their mediator, composing three forces acting within the social housing design. This research's contributions include an adaptable framework to facilitate the collaboration between architects and users in a future project, and The Flex House, an experimental design output applying the concepts proposed in this research using a frame as its primary structural and organizational system.

DEDICATION

To my father, João Cartaxo Loureiro (in loving memory)

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*Woke up this morning
Singing an old, old Beatles song
We're not that strong, my lord
You know we ain't that strong
I hear my voice among others
Through the break of day
Hey, brothers, say, brothers
It's a long way
It's a long and winding road
A água com areia
Brinca na beira do mar
A água passa, a areia fica no lugar
It's a long and winding road
(Caetano Veloso)*

At the beginning of this journey, my advisor told me: "Livia, the Ph.D. is solitary work; you must be prepared to handle it." Indeed, she was right; by now, I lost count of how many hours I spent developing this work alone. However, I discovered that all the solitary moments were only possible because of the support system that helped me arrive here. I am humbled to receive this recognition.

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All other work conducted for the dissertation was completed by the student independently.

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TABLE OF CONTENTS

	Page
ABSTRACT	ii
DEDICATION	iv
ACKNOWLEDGMENTS.....	v
CONTRIBUTORS AND FUNDING SOURCES.....	viii
TABLE OF CONTENTS	ix
LIST OF FIGURES.....	xi
LIST OF TABLES	xvii
CHAPTER I INTRODUCTION	1
Research Problem.....	2
Research Objectives	4
Research Questions	5
Scope	5
Research Significance	6
Outline of the dissertation	7
CHAPTER II LITERATURE REVIEW.....	9
Social Housing in Latin America: An overview	9
Architects’ Discourse on Social Housing: Beginnings	19
Elements of Participation: Definitions and Applications in Latin America.....	28
Open Building	28
Self-Help	31
Participatory Design.....	37
CHAPTER III METHODOLOGY.....	41
Timeline and Instrumental Case Studies.....	42
Data Collection.....	46
Data Organization	47
Data Analysis	47
The Participation Spectrum	51
Participation Spectrum Variables	52

Soft and hard (Schneider & Till, 2007).....	52
Soft and hard point scale rubric.....	53
Anticipated Results	56
CHAPTER IV CASE STUDY ANALYSIS	57
Introduction	57
Maison Dom-Ino (1914)	57
Historical context	58
Site context	60
Architectural theory.....	61
Project analysis.....	63
Participation spectrum assessment	67
Quartiers Modernes Frugès – PESSAC (1926).....	73
Historical context	73
Site context	75
Architectural theory.....	75
Project analysis.....	76
Participation spectrum assessment	82
Villaggio Matteotti (1974)	91
Historical context	91
Site context	92
Architectural theory.....	94
Project analysis.....	95
Participation spectrum assessment	103
Quinta Monroy (2003)	109
Historical context	110
Site context	111
Architectural theory.....	113
Project analysis.....	115
Participation spectrum assessment	118
CHAPTER V CONCLUSIONS.....	125
Introduction	125
Research Question One	125
Research Question Two	130
Soft & hard Framework: Enablement and Flexibility Towards Design.....	135
The Flex House: An Experimental Design Output	137
Future Avenues of Research	144
REFERENCES.....	147

LIST OF FIGURES

	Page
Figure 1: Site insertion of Pedregulho Housing Complex (1948), designed by Affonso Eduardo Reidy. Reprinted from Bonduki & Koury (2014).....	11
Figure 2: Façade detail of Pedregulho Housing Complex (1948), designed by Affonso Eduardo Reidy. Reprinted from Bonduki & Koury (2014).....	11
Figure 3: Site plan of PREVI (1969), showing housing organization. Image from Collegi D'Arquitectes de Catalunya at http://quaderns.coac.net/en/2013/05/previ-lima/	13
Figure 4: Before and after photos showing the customization of one housing typology in PREVI (1969). Image from Collegi D'Arquitectes de Catalunya at http://quaderns.coac.net/en/2013/05/previ-lima/	13
Figure 5: Timeline of social housing typologies' transition. Based on the works of (Rojas & Greene, 1995; Bonduki 1998, 2014; Jirón, 2004; Rolnik, 2014; and McGuirk, 2014).....	16
Figure 6: Sketches of Villa Spatiale by Yona Friedman. Reprinted from Friedman & Orazi (2015).....	24
Figure 7: Site plan, floor plan, and sections for Ville Spatiale. Reprinted from Friedman & Orazi (2015)	24
Figure 8: Stadt Ragnitz (1965-1969), a three-dimension structural and servicing framework for housing Photo credit Philippe Magnon at https://www.frac-centre.fr/_en/art-and-architecture-collection/domenig-eilfried-huth-gunther/stadt-ragnitz-317.html?authID=90&ensembleID=275	26
Figure 9: Levels of decision making, from collective to individual in the open building method. Reprinted from Kendall & Teicher (2000).....	29
Figure 10: Diagram showing the research methods employed in this study.....	42
Figure 11: Timeline showing the historical trend of architects and discourse for the selection of the case studies based on the literature review.....	44
Figure 12: Phases of data analysis.....	49
Figure 13: The case study design model employed in the dissertation. Adapted from Yin (2014)	50

Figure 14: Diagram showing the levels of participation established for the analysis of the case studies	51
Figure 15: Point scale for hard and soft	53
Figure 16: Representation of Maison Dom-Ino (1914), by Le Corbusier, as a module and clustered in a site proposition. Reprinted from Corbusier & Jeanneret (1948).....	59
Figure 17: Distinct site applications ideas for Maison Dom-Ino (1914), by Le Corbusier. Reprinted from Corbusier & Jeanneret (1948)	60
Figure 18: Volumetric possibilities of Maison Dom-Ino in a serial organization. Reprinted from Corbusier & Jeanneret (1948)	61
Figure 19: Volumetric possibilities of Maison Dom-Ino (1914), by Le Corbusier, in a serial organization. Reprinted from Corbusier & Jeanneret (1948).....	61
Figure 20: Le Corbusier's drawings investigating possibilities of organization in plan and site for Maison Dom-Ino in 1914. Reprinted from Corbusier & Jeanneret (1948).....	64
Figure 21: A sea of Dom-Ino interpretations at Favela da Rocinha in Rio de Janeiro. Photo credit Luiz B. Hering, “Resistance”: <i>Serie Urbanidades</i> (2019) at https://www.luizbheringfoto.com	66
Figure 22: Plan-based analytical diagrams of Maison Dom-Ino showing in lighter gray the areas where users can appropriate the design	69
Figure 23: Section-based analytical diagrams of Maison Dom-Ino showing in lighter gray the areas where users can appropriate the design.....	70
Figure 24: Radar chart showing the performance of Maison Dom-Ino (1914), by Le Corbusier, on each category generated from the soft & hard score	72
Figure 25: Soft & Hard mean for Maison Dom-Ino (1914), by Le Corbusier	72
Figure 26: Aerial view from the site of Pessac, in Bordeaux. Google Maps, 2020. Accessed on August of 2020	75
Figure 27: Modular generator cell for Pessac’s typologies. Reprinted from Boudon (1979).....	77
Figure 28: The built typologies of Pessac (1926), by Le Corbusier. Reprinted from Hsu & Shih (2006).....	78

Figure 29: Perspective drawing of Pessac (1926), by Le Corbusier, showing the housing typologies. Reprinted from Corbusier & Jeanneret (1948).....	78
Figure 30: Site Plan perspective drawing of Pessac (1926), by Le Corbusier. Reprinted from Corbusier & Jeanneret (1948)	80
Figure 31: Renovated typologies of Pessac (1926), by Le Corbusier. Imaged from 2017, photo credit Nikolas Ernult and courtesy of UNESCO at www.metalocus.es	81
Figure 32: Boudon’s conceptual site map of Pessac (1926), by Le Corbusier, indicating houses modified by its residents. Reprinted from Boudon (1979).....	82
Figure 33: Plan-based analytical diagrams of Pessac’s typologies #1 and #2 showing in lighter gray the areas where users can appropriate the design	84
Figure 34: Plan-based analytical diagrams of Pessac’s typology #3 showing in lighter gray the areas where users can appropriate the design.....	85
Figure 35: Plan-based analytical diagrams of Pessac’s typology #4 showing in lighter gray the areas where users can appropriate the design.....	86
Figure 36: Facade-based analytical diagrams of Pessac’s typology #1 showing in lighter gray the areas where users can appropriate the design.....	87
Figure 37: Facade-based analytical diagrams of Pessac’s typology #3 showing in lighter gray the areas where users can appropriate the design.....	87
Figure 38: Exterior design alterations at Pessac (1926), by Le Corbusier. Reprinted from Boudon (1979)	89
Figure 39: Exterior design alterations at Pessac (1926), by Le Corbusier. Reprinted from Boudon (1979)	89
Figure 40: Radar chart showing the performance of Pessac (1926), by Le Corbusier, generated from the Participation Spectrum score	90
Figure 41: Soft & Hard mean for Pessac (1926), by Le Corbusier	91
Figure 42: Aerial view from the site of Villaggio Matteotti, in Terni. Google Maps, 2020. Accessed on August of 2020	94
Figure 43: Participatory design sessions with the residents for Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Zucchi (1992).....	95

Figure 44: Masterplan of Villaggio Matteotti (1974), by Giancarlo de Carlo, showing circulation. Reprinted from Bracco, et al. (1977)	97
Figure 45: Masterplan of Villaggio Matteotti (1974), by Giancarlo de Carlo, showing collective spaces. Reprinted from Bracco, et al. (1977)	97
Figure 46: Unit combination at the site of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Bracco, et al. (1977)	98
Figure 47: Volumetric configuration of Typology 1 of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Zucchi (1992).....	99
Figure 48: Villaggio Matteotti (1974), by Giancarlo de Carlo, right after project delivery. Reprinted from Docomomo (2003)	101
Figure 49: Overall aesthetics of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Docomomo (2003)	101
Figure 50: Complex view of Villaggio Matteotti (1974), by Giancarlo de Carlo, highlighting the bridges and gardens of the project. Reprinted from Docomomo (2003).....	102
Figure 51: Plan-based analytical diagrams of Villaggio Matteotti's typologies showing in lighter gray the areas where users can appropriate the design.....	104
Figure 52: Section + Facade-based analytical diagrams of Villaggio Matteotti's typology 1 showing in lighter gray the areas where users can appropriate the design.....	105
Figure 53: Villaggio Matteotti exterior aesthetic, subordinated to its frame. Reprinted from Vitali, Positano, & Cambiaggi (2018) and edited by the author	107
Figure 54: Radar chart showing the performance of Villaggio Matteotti generated from Participation Spectrum score	108
Figure 55: Soft & Hard mean for Villaggio Matteotti	108
Figure 56: Street view from Quinta Monroy settlement in Iquique, before intervention. Reprinted from Aravena & Iacobelli (2012)	111
Figure 57: Quinta Monroy's site in the center of Iquique. Google Maps (2020). Accessed on July of 2020	112
Figure 58: Parallel Building concept developed by Elemental in 2001. Reprinted from Aravena & Iacobelli (2012)	113

Figure 59: Middle class neighborhoods from Iquique, demonstrating the DNA aimed by Quinta Monroy residents. Reprinted from Aravena & Iacobelli (2012).....	116
Figure 60: Site plan of intervention for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012).....	116
Figure 61: Typology organization for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)	117
Figure 62: Typology expansion for houses and apartments for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012) .	117
Figure 63: Before and after showing the result of user's appropriation of the design. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012).....	118
Figure 64: Plan-based analytical diagrams of Quinta Monroy (2003), showing in lighter gray the areas where users can appropriate the design.....	119
Figure 65: Façade-based analytical diagrams of Quinta Monroy (2003), showing in lighter gray the areas where users can appropriate the design.....	120
Figure 66: Unfinished project from the architects' perspective. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012) .	122
Figure 67: A finished house from a residents' perspective. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012).....	123
Figure 68: Radar chart showing the performance of Quinta Monroy generated from Participation Spectrum score.	124
Figure 69: Soft & Hard mean for Quinta Monroy	124
Figure 70: Charles-Dominique-Joseph Eisen (1720–1778), Frontispice from <i>Essai sur l'architecture</i> , second Edition, 1755. Engraving at https://drawingmatter.org/other-lives-charles-eisen-and-laugiers-essai-sur-larchitecture/	128
Figure 71: Diagram showing how the roles of architect, users, and the grid adjust using the Soft & Hard Score.....	131
Figure 72: Diagram showing the distribution of roles within Pessac (1926), and Villaggio Matteotti (1974).....	132

Figure 73: Diagram showing the distribution of roles within Maison Dom-Ino (1914), and Quinta Monroy (2003)	133
Figure 74: User customization on the exterior of one of Pessac's (1926) houses. Google (2019). Accessed on August of 2020	134
Figure 75: User customization on the houses at Quinta Monroy. Google (2015). Accessed on August of 2020	135
Figure 76: Soft & Hard Framework	136
Figure 77: Sketch of the Flex House section demonstrating how the frame establishes the limits and possibilities of user occupation.....	139
Figure 78: Image showing a variable of urban occupation of the Flex House. Drawing developed for the CodHab competition (2017)	140
Figure 79: Sketch showing the module and possible house organization inside of the grid of the Flex House	141
Figure 80: Image showing two different typologies generated from the frame: single family and row house.....	142
Figure 81: Image showing a plan composition for the Flex House	143
Figure 82: Renders demonstrating the aesthetic variety of appropriation that can happen in collaboration with the users	144

LIST OF TABLES

	Page
Table 1: Summary of elements that characterize housing programs in Latin America and the Caribbean. Bouillon (2012), edited and translated by the author	19
Table 2: Summary table showing the case studies and their relevance based on the literature review	45
Table 3: Table depicting the variables for the analysis of each case study.....	52
Table 4: Table showing the rubric for the Soft & Hard point scale	54
Table 5: Case study analysis table combining all the concepts and variables	55
Table 6: Participation spectrum score for Maison Dom-Ino (2014), by Le Corbusier	72
Table 7: Participation spectrum score for Pessac (1926), by Le Corbusier	90
Table 8: Participation spectrum score for Villaggio Matteotti.....	108
Table 9: Participation spectrum score for Quinta Monroy.....	124

CHAPTER I

INTRODUCTION

The built environment of Latin American¹ cities is defined and transformed by housing. They are the element that delineates urban fabric, occupation, and density in a context that is the most urbanized developing region in the world (Bouillon, 2012). This condition should place the habitat as one of the basic typologies developed in architecture. The production of social housing projects in this territory is mostly neglected to quantitative solutions that prioritize standardization, socio-spatial segregation, and densification through urban sprawl (Balchin & Stewart, 2001; Aravena & Iacobelli, 2012; Bouillon, 2012; Rolnik, 2014).

While the term² can assume distinct definitions according to the cultural background, which is related and produced, in Latin America, the meaning "refers to any form of low-income³ housing whose provision and the ability to pay for it are supported by the state, albeit to a limited extent" (Balchin & Stewart, 2001, p.334). It is also characterized as "as housing produced and financed by the government intended to the

¹ This research was developed analyzing the context, theories, and definitions applied to Latin America. While discussing the broader context of the aforementioned territory, I will highlight two countries that are relevant to the discussion of this research: Brazil and Chile.

² Social housing in Latin America can also be defined as affordable housing, usually as part of a governmental incentive to low-to middle income populations. Public housing, on the other hand, is associated with rental policies and projects also provided by the government. (Rojas & Greene, 1995; 2008; Balchin & Stewart, 2001; Bouillon, 2012)

³ Low- income population can be classified as people living on less than the *International Poverty Line*, which by international standards is quantified at US\$1.90 per day. For instance, in 2015 the World Bank showed that 3.5% of the people in Brazil were living under the international poverty line, while in Chile this percentage was less than a half, with 1.3%. In contrast, when observing the poverty trend by national standards in the same year, Brazil revealed 8.7% of its citizens living below the line, and Chile 11,6%.

low-income population," (Bonduki, 1998, p.8), and as a "merchandise of public interest inside the politics of capitalism" (Paul Singer, 1998, p.5).

Studies demonstrate several responses towards the issue, mostly adjusting past solutions to contemporary contexts (UN-HABITAT, 2007) and focusing on discussions of history, policy, and government programs. They also show architects disconnected from the social housing production, being responsible only for the design of houses with no relation to the context or the users (Servigna, 2016; Lamounier, 2017). Open building, self-help, and participatory design⁴ are distinct approaches to social housing that focus on promoting collaboration between architects and users towards the autonomy⁵ of design (Habraken, 1972; Turner, 1976; Kendall & Teicher, 2000; Aravena & Iacobelli, 2012). The application of open building and participatory design occurs mainly across Europe and Japan (Schneider & Till, 2005; 2009). On the other hand, self-help is mostly observed in Latin America, primarily present in informal communities and not affiliated with governmental housing programs (Ferro, 1969; Jirón, 2004; Greene & Rojas, 2008; Morado Nascimento, 2011).

Research Problem

Research shows that conventional designs for social housing in Latin America are not interested in the accessibility of urban social networks because they are mostly built

⁴ The meaning of these terms will be detailed in the Literature Review chapter of this document.

⁵ This study considers autonomy as the possibility of user collaboration and appropriation in social housing design.

on isolated areas (Salingaros et al., 2001; Amore, Shimbo, & Rufino, 2015). Housing deficit is understood as quantitative demand, a product to be commercialized. The projects' success relates to the number of "units" and the immediate impact on individuals, rather than the communities' quality - or sustainability - of life (Rolnik, 2009; 2014). The historical understanding of the house as a product (Ferro, 1969; Bonduki, 1998; Klaufus & Ouweneel, 2015; Rolnik R., 2014; Lamounier, 2017) reflects in the loss of people's sense of place⁶ from architecture. Studies in Latin America demonstrate the exclusion of the architect from social housing production (Bonduki, 1998; Balchin & Stewart, 2001; Jirón, 2004; Bouillon, 2012; Lamounier, 2017). This exclusion emphasizes a gap between architects and users, which translates into inadequate⁷ housing projects.

Design and development of open building systems and customization of housing have been for many years a part of several architects and researchers' pursuit of feasible solutions (Habracken, 1972; Ward, 1972; 1976; Kendall & Teicher, 2000; MOM, 2008; Aravena & Iacobelli, 2012; Lamounier, 2017). These strategies aimed to solve housing demand, industrialization and customization "without falling in the repetitious ploys of mass production" (Kendall & Teicher, 2000, pp.16). Nevertheless, contemporary architects still need to embrace the inherent capacity of indeterminacy that exists within

⁶ Canter (1977) suggested that the sense of place would be the indescribable quality that at the same time, says everything on the physical and environmental variety of urban spaces. The juxtaposition of three spheres of our consciousness: activities/uses, physical attributes, and conceptions/images create this sense. This study believes that this concept is a crucial feature that needs to exist in a social housing project.

⁷ Inadequate in the context of this study refers to social housing projects that fail to consider user input and are produced following a standardized design (Beirão, 2012; Klaufus & Ouweneel, 2015).

a design, especially in social housing (Schneider & Till, 2005; 2009; Baltazar, 2009; Aravena & Iacobelli, 2012).

The inclusion of open building, self-help, and participatory design in social housing projects can have the potential to optimize urban, typological, and social conditions of future projects. By allowing decent living conditions, a property-oriented policy serves as an economic mechanism to overcome poverty (Aravena & Iacobelli, 2012). This study aims to contribute to the existent scholarship by establishing a framework of participation elements⁸ applied to social housing allied with a discussion of the architect's role. Thus, inspired by the time where "architecture consisted not simply of buildings but people and buildings bound in a relationship of reciprocal necessity" (de Carlo, 1980, p.74).

Research Objectives

The objectives of the study are:

- To propose a framework for the design and conception of social housing projects in Latin America using open building, self-help, and participatory design.
- To address the contemporary role of the architect in social housing.

⁸ For the purposes of the dissertation, open building, self-help, and participatory design are classified as participation elements.

Research Questions

This dissertation proposes an analysis concerning participation elements - open building, self-help, and participatory design -, as a desirable framework for social housing projects in Latin America while reassessing the architect's role. Thus, the questions this study aims to answer are:

- **How can open building, self-help, and participatory design act as a framework for social housing design?**
- **What is the contemporary architect's role in social housing production?**

Scope

Four social housing projects composed the investigation:

- Maison Dom-Ino (1914), by Le Corbusier ;
- Quartiers Modernes Frugès – “*Pessac*” (1926), by Le Corbusier ;
- Villaggio Matteotti (1974), by Giancarlo de Carlo;
- Quinta Monroy (2003), by Alejandro Aravena

The selection of the architects and their projects observed their effect on pivotal changes⁹ in social housing discourse. These changes occurred approximately every thirty years under a hundred-year time frame, from 1914 to 2014¹⁰. Le Corbusier, Giancarlo de Carlo, and Alejandro Aravena appear in literature as essential figures

⁹ The relevance of the case studies and the aforementioned pivotal changes are detailed in a summary table inside the Methodology section of this document.

¹⁰ A timeline outlining the main events, discourse, and projects relevant to the dissertation and selection of the case studies is presented in the Methodology section of this document.

whom ideas, theories, and projects historically influenced social housing production in Latin America (Barone, 2002; Schneider & Till, 2007; McGuirk, 2014).

Data collection for the projects will focus on gathering architectural drawings (site plan, floor plan, and façade), archival records (public databases, users' interviews, post-occupation surveys), literature review, and other relevant data for the investigation.

Research Significance

Previous research focused on studying and critiquing history, models of production, and urban impacts of social housing projects. Bastos (2010, p.213) argued that "each simple action in the theme of social housing always gathers a huge symbolic meaning with its few triumphs (and much fiascos) amplified to the maximum: these subjects never run out solely on what it is, but mainly on what could become."

Thus, the research intends to contribute to three primary contexts: theoretical, social, and practical. The theoretical sphere will bring a position about the contemporary role of the architects in social housing. Although this position targets Latin America, it will be a departure point for a broad discussion with other geographical and cultural contexts. In the social sphere, the study will amplify the possibilities for the dissemination of architectural culture for the 98% of the population (Bell, 2004; Bell & Wakeford, 2008) with a framework and reinterpretation of the way to live more grounded to the reality and free from architectural bias. Lastly, in the practical sphere, it will offer a methodology for design and participation to be learned by the architects to reintroduce them in social housing, first in Latin America, and next to other pertinent contexts. As

De Carlo (1980, p.71) emphasized, "the direction we take will be crucial, not only for architecture but also for the evolutions of relationships between physical space and society."

Outline of the dissertation

This dissertation is divided into five chapters described as follows:

- **Chapter I – Introduction:** Presents background information about the topic and details the research topic, objectives, research questions, and scope.
- **Chapter II – Literature Review:** Comprises the literature review developed relating the three main topics discussed in this research: *social housing in Latin America*, the *architects' discourse in social housing*, and the elements of participation: *open building, self-help, and participatory design*. It outlines relevant studies pertaining to each topic while summarizes the significance of each subject within the scope of the study.
- **Chapter III – Methodology:** Contains the methodology applied in the dissertation. Clarifies the two phases of the case study investigation, explaining each area of analysis.
- **Chapter IV – Case Study Analysis:** Comprehends the individual evaluation developed for each of the four case studies of the research.
- **Chapter V – Conclusion:** Summarizes the case studies' analysis findings, answering the research questions. Details the dissertation's theoretical

contributions, and offers recommendations and possibilities for future avenues of research.

CHAPTER II

LITERATURE REVIEW

Social Housing in Latin America: An overview

There is a great amount of research on the subject of social housing in Latin America. The majority of the scholarship has focused on investigating the historical events that helped shape how social housing is produced today in the continent.

In the architectural context, the influence of the Modern Movement's concepts in the schools of architecture envisioned the architect as an individual who possessed all the necessary skillset concerning social housing as their forefront pedagogy. This tradition historically shaped the typologies developed by architects and engineers. To understand the history of social housing in Latin America, it is essential to acknowledge that informality walks hand-in-hand with urbanization. Informality has become not only a powerful but cruel phenomenon, being responsible for the occupation of at least 50% of urban land in the region (Gonzales, 2000 *appud* Balchin & Stewart, 2001), but also the prevailing mode of production of houses for the low-income population. Balchin & Stewart (2001) reinforced that condition when pointed out that in for instance, in Mexico:

the majority of housing (up to 66 per cent) was provided by the informal sector through grass roots initiatives (Ortiz, 1994; Potter and Lloyd Evans, 1998). In Colombia, by contrast, the government's response to the growing issue of shantytowns – that accommodated 60 per cent of the total population by the 1990s (Potter and Lloyd-Evans, 1998) – was to legalize tenure to encourage residents to develop their own solutions to their housing problems. (p.37)

In Brazil, for instance, Bonduki (1998; 2008; 2014) stated that the decades from 30 to 50 were established as the period where the theme of housing was thoroughly discussed and problematized as a specific product that "cannot be produced or commercialized as any other merchandise." (Bonduki 1998) The IAPs - *Institutos de Aposentadoria e Pensões (Institutes of Retirement and Pension)* marked the birth of housing as a social issue in Brazil. Also, they promoted the architect's inclusion in discussion with the incorporation of Modern Movement ideals that would influence both the production, prefabrication and standardization and a "revised" way of life. (Bonduki 1998, p.15). The figure of engineer and urban planner Carmen Portinho¹¹ appeared in this moment as one of the major pillars advocating for this ideology, which resonates loudly until today in most Brazilian architecture schools (Bonduki, 1998; Nascimento, 2007). Furthermore, the housing complex Pedregulho¹², seen in Figures 1 and 2, developed in 1948 by the architect Affonso Eduardo Reidy (1909 – 1964) materialized in Rio de Janeiro, Brazil, the embodiment of modernist living (Nascimento, 2012) and as (McGuirk, 2014, p.16) remarked, “a spectacle of itself; a tropical utopianism at work.”

¹¹ Carmen Portinho (1903 -2001), Reidy's wife and practice partner, was a Brazilian engineer and urban planner responsible for major advancements on social housing policies and projects in Rio de Janeiro, Brazil. As director of the DHP (Department of Popular Housing) of the state, she applied the modernist ideologies of CIAM especially regarding high rise-high density housing. (Nascimento, 2007, 2012; Benmergui, 2012)

¹² The project of Pedregulho, designed between 1946 and 1948 is one of the most representative examples of high rise-high density projects in Brazil. Built to materialize the modernist ideal and catch the attention of the whole world (Bonduki, 1998). As a representation of Brazilian modernism of the 1940s and 1950s, embodied “all the elements vital to the functioning of a neighborhood unit: school, market, laundry, health center, duplex apartments, swimming pool, gym, sports court, playground, social and public nursery.” (Nascimento, 2012, para. 3)

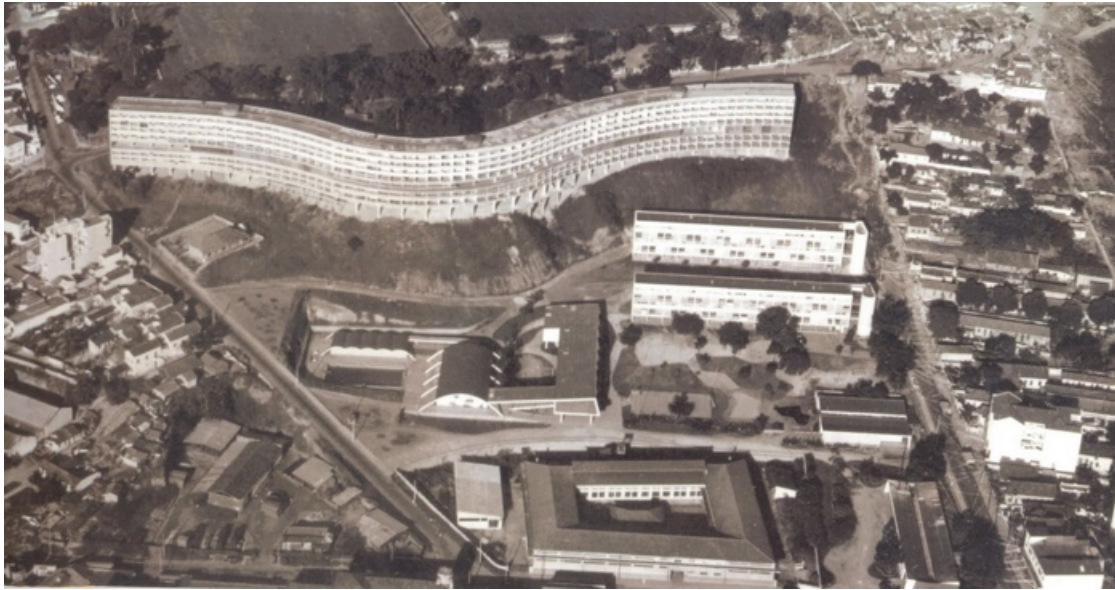


Figure 1: Site insertion of Pedregulho Housing Complex (1948), designed by Affonso Eduardo Reidy. Reprinted from Bonduki & Koury (2014)



Figure 2: Façade detail of Pedregulho Housing Complex (1948), designed by Affonso Eduardo Reidy. Reprinted from Bonduki & Koury (2014)

In contrast, in Peru, president and architect Fernando Belaúnde (1912 – 2002) created the PREVI – Proyecto Experimental de Vivienda (*Experimental Housing Project*) in 1968 to fight the growing informal settlements in the country. In this initiative, the usual mega block was discarded to leave place for a scheme of incremental individual houses (McGuirk, 2014). With 467 houses, the site plan (see Figure 3) covered about twelve hectares. The PREVI project was one of the first in Latin America to acknowledge the research of Turner (1976) to include self-help in the provision of social housing, nevertheless the solution was a hybrid that encompassed both architectural quality¹³ and participation, seen in Figure 4. Several prominent architects in social housing at the time such as James Stirling (England), Aldo van Eyck (Deutschland), Fumihiko Maki (Japan), Charles Correa (India), and Christopher Alexander (1977) were *called to serve*, making this project the first example in Latin America that puts the architect in a position of collaboration with the residents.

¹³ Architectural quality in this context means the recognition of the knowledge of the architect as the vital precursor of a social housing project, in the sense that it is the architect's responsibility to enrich and residents' lives through good design practices.



Figure 3: Site plan of PREVI (1969), showing housing organization. Image from Col·legi D'Arquitectes de Catalunya at <http://quaderns.coac.net/en/2013/05/previ-lima/>

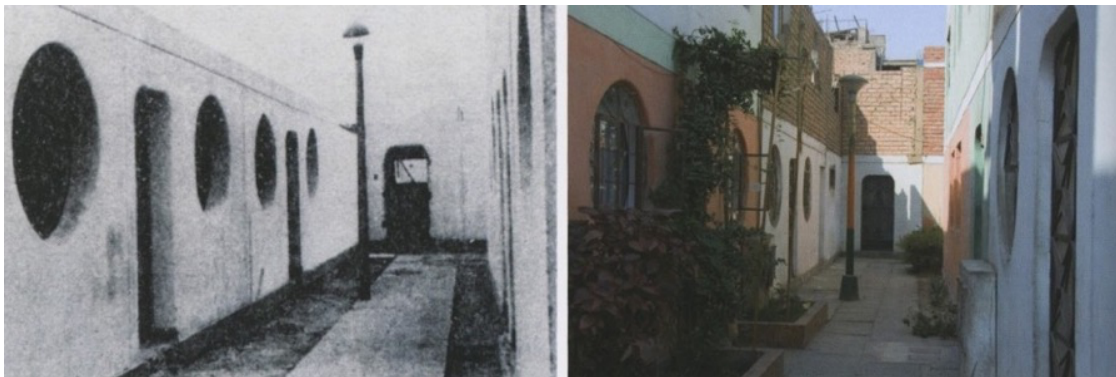


Figure 4: Before and after photos showing the customization of one housing typology in PREVI (1969). Image from Col·legi D'Arquitectes de Catalunya at <http://quaderns.coac.net/en/2013/05/previ-lima/>

Yet, while The PREVI project represented a mark in terms of collaboration and understanding of the effective role of the architect in social housing, this experience was blindsided by the growing paternalism in the way Latin American governments continued to pursue the housing deficit. A significant intervention of State in the housing question appeared in the 1960s, with neoliberal policies that showed different performances concerning the levels of intervention of the private sector, civil society, and the beneficiaries of the housing programs (Ramirez, 2002; McGuirk, 2014; Rolnik, 2014). There have been some advances in programs and proposals providing accessibility to housing in Latin America. However, exists a considerable gap and discrepancy between the needs of a significant part of the population and typological alternatives. This reality was so because the effectiveness of programs and actions depended on the priorities and agenda of each government (Martins et al., 2007). Allied to the governments' agenda priorities, most of the implemented solutions to the deficit unfolded into harmful interventions to the urban environment, with few qualitative results and unsustainable measures to the economic, social, and environmental spheres.

In this context, it is important to highlight the massive production of High-rise/High-density projects that dominated the architectural scenario of Venezuela, Argentina, Chile, and Brazil. The military dictatorships that held these countries in their grip for long stretches between the 1950s and the 1980s used housing estates not only tools for driving the economy, but rather "they were used to relocate squatters from prime sites to the periphery, creating polarized cities" (McGuirk, 2014, pp.43). Cruz (2013, p.237) went even further when it revealed the blatant truth of the many years of

typology production as a modernist utopia in Latin America. He stated that "the possibility of providing housing for the poor in high-rise and middle-rise buildings became a dystopia, being seen today as doomed symbols of the own rationality that have conceived them." This realization, along with the crescent informality that entrenched rapidly in the urban centers of the region, the figure of the architect started to disband. The focus on the social housing provision changed from the experimentation of Modernism and to the laboratory of participation and user empowerment to mass production quantitative solutions masked as housing "designs". Justin McGuirk (2014, p.52) validated this deduction, as he stated that "with the demise of social housing as a government priority, not just in Latin America but in America and Europe, architects, I would argue, lost their social purpose."

The typology timeline seen in Figure 5 demonstrates the transition of social housing typology in Latin America. The timeline was based on the works of Bonduki (1998; 2014), Jirón (2004), Rolnik (2014), (Amore, Shimbo, & Rufino, 2015), and Rojas & Greene (1995), represents an attempt to convey not only the types but also the other forces involved; political, socioeconomic and sometimes concealed that may have played a critical role in the history of social housing in both countries.

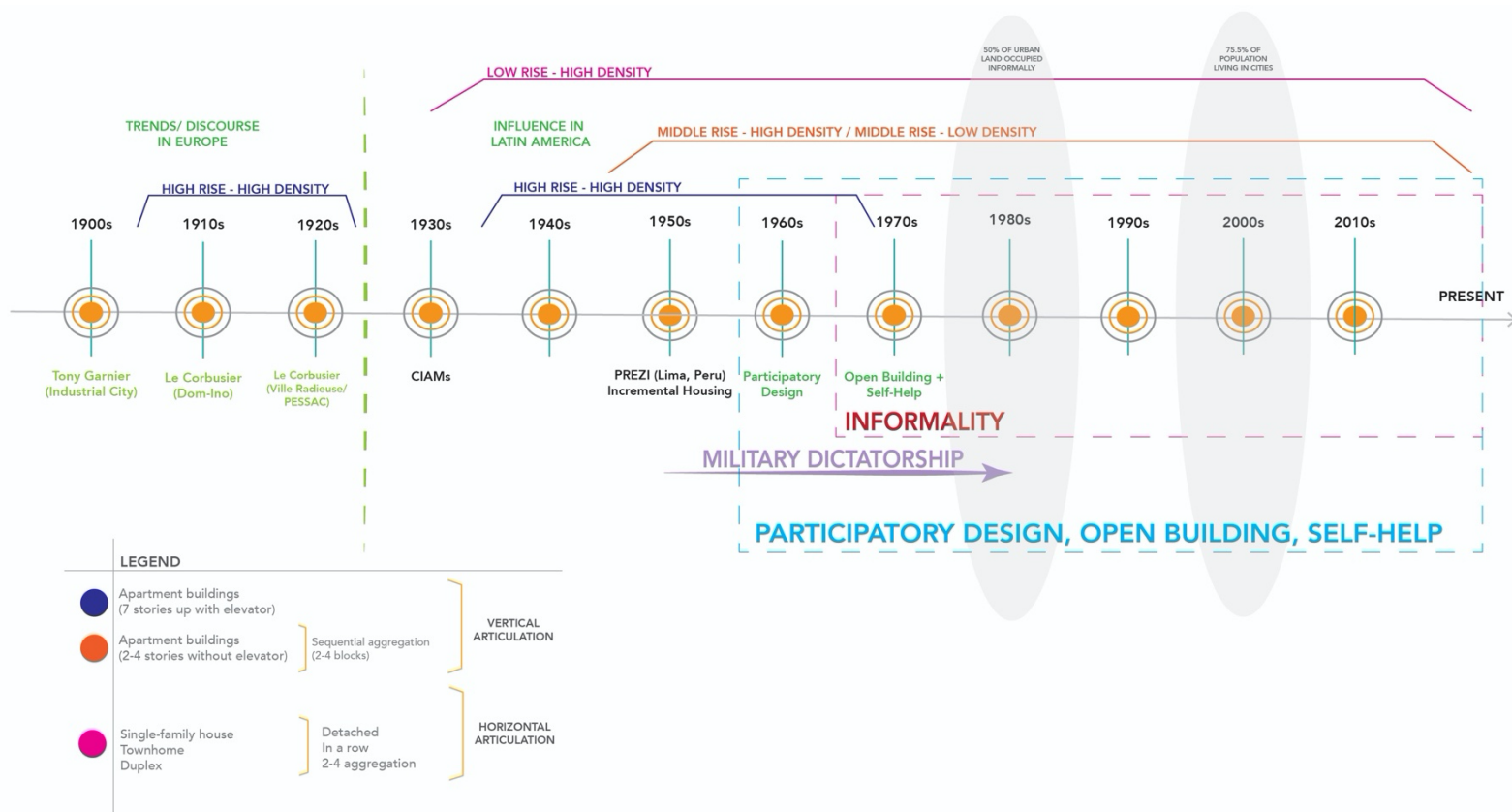


Figure 5: Timeline of social housing typologies' transition. Based on the works of (Rojas & Greene, 1995; Bonduki 1998, 2014; Jirón, 2004; Rolnik, 2014; and McGuirk, 2014)

Regarding public policies, Rolnik (2014), argued that Chile was one of the first third world countries to adopt the proposed neoliberal formulas of the School of Chicago in several administrative areas, thereby reducing the State's intervention, promoting market participation, and directing public subsidies towards impoverished groups. The country put forward a housing policy in an attempt to assuage the housing deficit that became a reference to other Latin American countries since the 1990s up to today (Rojas & Greene, 1995).

The political reform that occurred in the 1980s had financial support from institutions like the World Bank and the Inter-American Development Bank (IDB) (Rubin, 2013). It began a housing finance policy in 1985, in which the State subsidized and the private sector executed. This policy became an example between Latin American countries. The policy consisted of three pillars: economy, subsidies, and credit. This policy gained remarkable success as Chile could be taken as the only country in Latin America to reduce its housing deficit (Serrano, 2002). Ecuador, Guatemala, Colombia, Honduras, and Venezuela took the Chilean housing strategy as a model to create solutions to their realities. Still, in countries with lower income and less elaborated public administration the result obtained by the intervention was not satisfactory, hence informality started to contour the urban areas of the metropolitan cities uncovering both the brutal lack of access to opportunities by low-income citizens, and their astonishing autogestion power (Lefebvre, 2009).

Also, in Chile, the housing programs and policies have one fundamental difference from Brazil: the allowance of self-help to be included in the process since the

1900s, along with purposes that included improving public hygiene, assisting vulnerable groups and promoting sectorial involvement (Jirón, 2004). In 1973, a military regime was installed, and policies were viewed from a neoliberal lens, with housing seen as a commodity being subsidized by the government, and the regulations of land distribution not being entirely responsible concerning urban growth. (Jirón, 2004) Later, in 1979, an Urban Development Policy was created with the purpose of ensuring the healthy growth of the city fabric and the peripheral housing developments (Jirón, 2004; Castillo & Hidalgo, 2007). The initiative was not very successful since land invasions quickened in cities such as Santiago. In 1985, this policy was replaced by an adjusted version that aimed to regain control of the metropolis' development in lieu of housing developments and informal occupations (Jirón, 2004; Castillo & Hidalgo, 2007).

Table 1 summarizes one the most recent studies (Bouillon, 2012), considering the current housing programs in Latin America. It is fairly noticeable that most of the governments see the provision of housing as a finished product for consumption rather than an opportunity for truly reaching the impoverished and ensure their right to housing (Maricato, 1996; 2001).

HOUSING PROGRAMS IN LATIN AMERICA AND THE CARIBBEAN										
Focus	The State guarantes access to adequate housing					The government facilitates the operation of the housing markets				
Program Type	Public interventions directed to the housing sector					Inteventions in favor of the markets				
Country	Provision of finished housing by the government	Provision of incremental housing by the government	Land supply with services from the government for residential use	Official financing for subsidized housing	Improvement of settlements and regulation of tenure	Housing improvement	Subsidy for housing purchase	Public finance for incremental housing	Regulations to facilitate the subdivision of land for residential use	Interventions to broaden the private financing of housing
Argentina										
Barbados										
Bolivia										
Brazil										
Chile										
Colombia										
Costa Rica										
Ecuador										
El Salvador										
Guatemala										
Guyana										
Honduras										
Jamaica										
Mexico										
Nicaragua										
Panama										
Paraguay										
Peru										
Dominican Republic										
Suriname										
Trinidad and Tobago										
Uruguay										

Table 1: Summary of elements that characterize housing programs in Latin America and the Caribbean. Bouillon (2012), edited and translated by the author

Architects' Discourse on Social Housing: Beginnings

In Latin America, discourse regarding the social function of the architect in social housing can be traced back to the Pan-American Congresses of Architects¹⁴, which started in 1920 and continue to happen until today. Amongst their discussions a Latin American reflection concerning theories that would be later examined in Europe, in the

¹⁴ The Pan-American Congresses of Architects were an event created by a group of architects from Uruguay who wanted to regulate the architectural profession in the country (Atique, 2005). The last edition of the Congress happened in 2012, in Maceio, Brazil, and focused on discussing the implications of contemporaneity in the American territory. (ArchDaily Brasil, 2012)

Congresses of Modern Architecture (Atique, 2005). These topics featured an awareness of urban planning issues due to the development of cities, the question of housing, the proper regulation of the architectural profession, and the model of pedagogy applied in the schools of architecture (Atique, 2005).

Later, in the CIAM¹⁵ of 1929 realized in Frankfurt, the subject of “Minimum Housing” posed architects with the question of how to manage the alarming housing deficit that emerged after World War I (Gideon, 1964; Goldman, 1998; Mumford, 2000; Barone, 2002). The responses were varied, with one thing in common: the view of the house as a flexible but reduced space, where only the utmost essential should be considered. Giancarlo De Carlo (2005, p.6), a member of the TEAM X compared the contribution offered by the architects in the Congress to a prescription: “the remedy prescribed was the construction, possibly in series, of cheapest possible housing. It was reduced to the absolute minimum tolerable in terms of floor area; a minimum referred to as ‘existential’”. The existential concept proposed by the architects at CIAM had a great potential in fostering solutions that would challenge the issues of social housing deficit and rise above them. However, since then, houses “became cultural alibis for the most ferocious economic speculation and the most obtuse political inefficiency” (De Carlo, 2005, p.7). The combination of the discussions realized both in the Pan-American Congresses, and the CIAM creates a moment of impact in architecture because it

¹⁵ CIAM, the Congrès Internationaux d'Architecture Moderne (International Congress of Modern Architecture), happened between 1928 and 1959 across Europe. The congresses featured the most prominent architects of the time, discussing a series of relevant topics within the field of architecture within the years with the goal of disseminating the premises of the Modern Movement. (Gideon, 1964)

represented the realization of the social agency of architects, and how they could contribute meaningfully in pressure matters of society.

The Modern Movement is commonly cited in the literature as the initial mark of the awareness of the social role of the architecture, epitomizing most of the European thought in the 1930s (Gideon, 1964; Mumford, 2000; Gamez & Rogers, 2008). The CIAMs, Congrès Internationaux d'Architecture Moderne (International Congresses of Modern Architecture), were based on several themes that affected society early in the 20th century, in highlight: minimum housing (1929, Frankfurt), rationally planned housing settlement (1930, Brussels), and the Functional City (1931, Berlin). The projects and theories discussed in the congresses were broadly publicized as an architectural discourse that influenced much of the developed world, especially Latin America (Bonduki, 1998; 2014; Mumford, 2000), and put the architect as a highly knowledgeable individual with the capacity to maximize every set of issues faced by social housing in an efficient response.

Despite the political engagement, the Modern Movement ideals were a top-down awareness, with “great simplification of interpretations of human and social behavior” (de Carlo, 1980), in the sense that universal design guidelines and professed truths would not be useful on all contexts, where narratives and styles were challenged by unheard voices that possessed their language and vernacular understanding (Heynen, 1999; Gamez & Rogers, 2008). In this scenario, Le Corbusier (1986; 2006) appears in literature as the one of the most prominent figures leading the critical thinking and proposals for social housing. His design of the Maison Dom-ino (1914), served as an

initial prototype of prefabricated structure for mass production, while encompassing his main premises for Modernist architecture. Fernando Lara (2011) and Justin McGuirk (2014) both linked Dom-Ino with Latin American informal settlements saying that it was the favelas' mode of construction, with the latter granting a humorous reflection on it:

the Dom-Ino method is not so different from the way most favela housing is built these days, making it – ironically – one of the most successful housing models ever. However, in the hands of the master architect, it exemplified the tension between the pragmatic half-solution and the idealism of citizen participation (McGuirk, 2014, p.74).

In contrast, also in Europe, the Ob'edineniye Sovremennikh Arkhitektorov – OSA (Union of Contemporary Architects) founded in 1925 in Moscow, understood that architectural skills were “central to the definition and construction of social questions and new ways of life and living” (Awan, Schneider, & Till, 2011). Before Turner use the term enabler¹⁶ in 1985, the OSA disseminated the “notion of the architect as an organizer of building” (Awan, Schneider, & Till, 2011). Moisei Ginzburg, one of the founders of the OSA, was one of the first architects to bring to light the importance of the user's input whom to him, had a specific contribution to architecture, which was a collective act, a participatory result, a continuous process. Different from the starchitects from the Modern Movement, OSA placed the architect as an in-between actor, “synthesizing different positions without overwhelming them” (Awan, Schneider, & Till, 2011). In offering a different perspective of how architects would best contribute to social issues

¹⁶ Turner (1985) wrote about the role of the architect as an enabler, as a professional that would allow clients to be a part of the design process.

the group presented a concurrent response to the broadly spread conclusions of the CIAMs, anticipating in a way the participation movement that emerged later in the 1970s.

In 1960, Hungarian architect Yona Friedman (1923-2020), developed the first schemes for his project of Ville Spatiale, depicted in Figures 6 and 7, an elevated city that allowed for people to compose their own house design in a scheme that would add density to the existent fabric of the cities. His concept for the project was:

Any attempt at a static solution would be unwise. We propose a mobile urbanism which would search for techniques allowing the construction of large units within which an infinite flexibility is required; techniques allowing the provision of supplies (water, energy, sewage disposal) capable of rapid alteration and reutilization; techniques using elements, inexpensive, simple to erect, easy to transport, reusable. (...) Planning becomes bearable, because it is not definitive, and the possibility of correction or experimentation is still there. (Friedman & Orazi, 2015, p.48)

Villa Spatiale represented a turning point for housing due to its speculative frame idea, allied with the total freedom¹⁷ of choice in matters of living.

¹⁷ Yona Friedman developed a formal and spatial language called Flatwriter, that in theory would allow inhabitants to compose their own dwellings under his superstructure of Ville Spatiale.

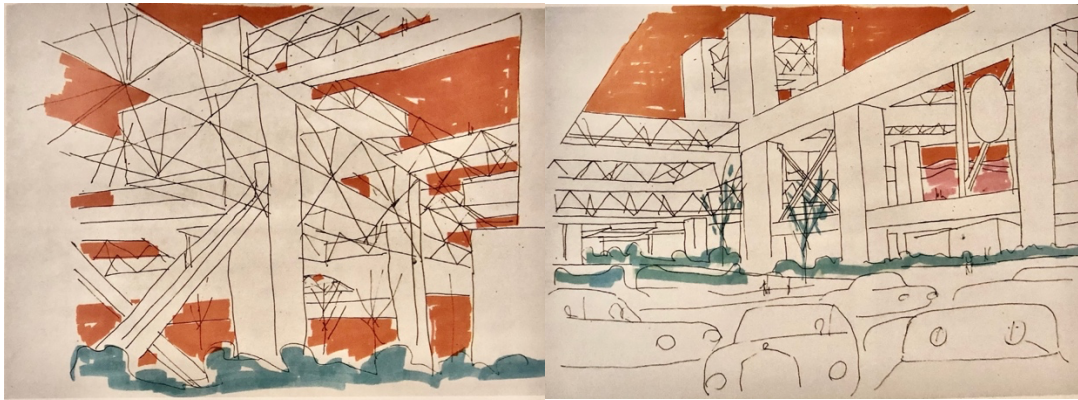


Figure 6: Sketches of Villa Spatiale by Yona Friedman. Reprinted from Friedman & Orazi (2015)

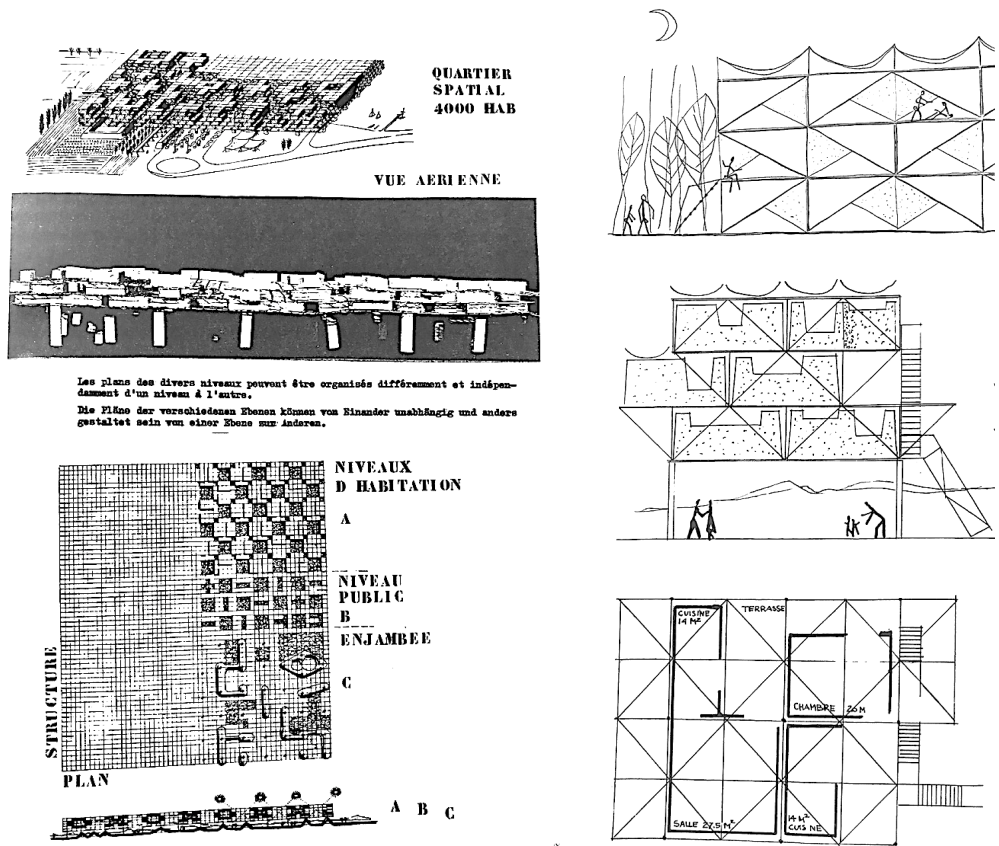


Figure 7: Site plan, floor plan, and sections for Ville Spatiale. Reprinted from Friedman & Orazi (2015)

Having Friedman as one of his precedents, Eilfried Huth (1930 -) an Austrian architect who adopted not only the role of social contributor but associated participatory design and self-help in his projects is also worth mentioning within this initial context of emerging figures.

To him, architecture was:

An instrument of mediation and of translation: it lies at the intersection between the collective and the individual, characterized by the relevant social and local environment. Architecture satisfies people's most elementary and most basic needs. Above all, however, architecture makes its presence felt; it is intrinsically and explicitly experimental. (...) It is about space, non-space, comfort and discomfort. The process of participation in self-help has almost become like a vocation. It is much more than a job. (Huth, 2005, p.141)

One of his most important projects, Stadt Ragnitz (1965-1969), displayed in Figure 8, won the Grand Prix International d'Urbanisme in Cannes, in 1969. It was a "three-dimensional structural and serving framework that could be dwelled in various ways" (Huth, 2005, p.142), very relatable with the flexibility concept proposed by Yona Friedman in 1960 for it being a skeleton with infinite possibilities but different from the modernist, Huth conceived Stadt Ragnitz embodying participation and self-help as vital components of the project.

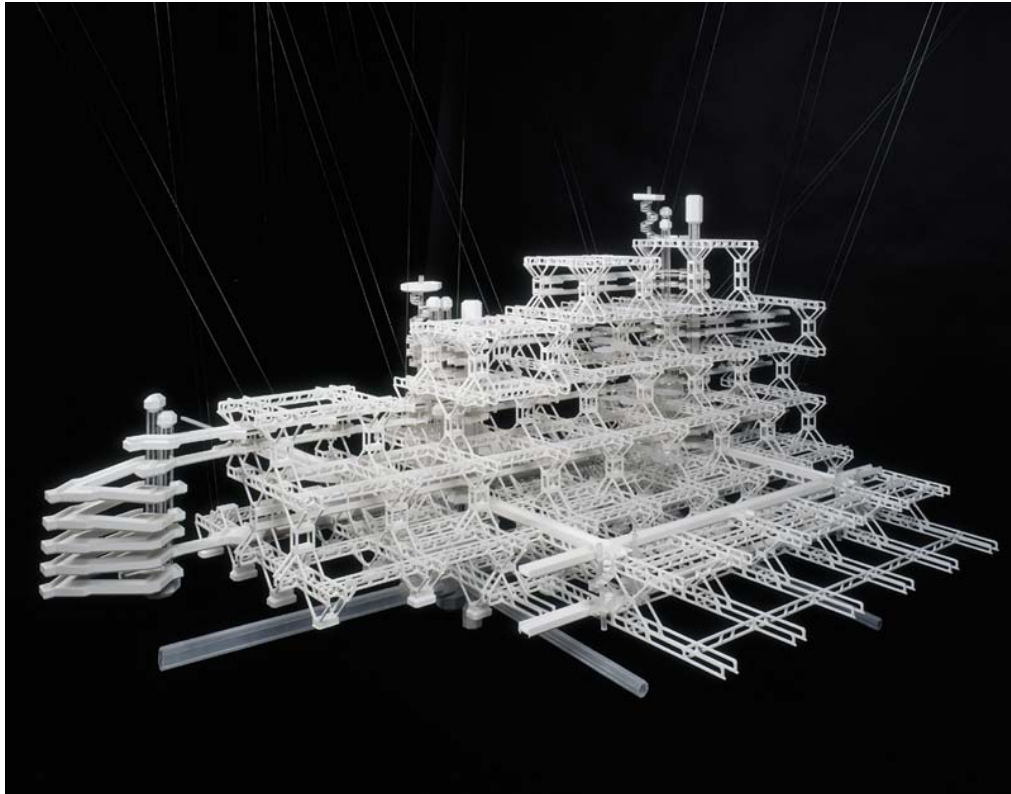


Figure 8: Stadt Ragnitz (1965-1969), a three-dimension structural and servicing framework for housing Photo credit Philippe Magnon at https://www.frac-centre.fr/_en/art-and-architecture-collection/domenig-eilfried-huth-gunther/stadt-ragnitz-317.html?authID=90&ensembleID=275

The research and debates that derived from the consideration of the elements of participation and the importance of the social role of the architect in the contemporaneity generated a new “movement,” known as Public Interest Design. Also called Public Interest Architecture, it is rooted participation and works by having designers tackle communities’ issues through a collaborative process, thus empowering the public and ensuring validity in interventions. Bryan Bell (2004; 2008, pp.12) is one of the most recognized advocates of the movement, and stated that “architects’ most significant contributions can be as the form-givers for others, shaping lives in the most fundamental

and personal ways.” Gutman (2004, pp.41) also stressed that architects must work as advocates when it comes to social housing, even if this means “advocating for their own competence and their own ideas.”

Reflecting on the need to bring social justice through social housing, (Wilson, 2008), cited the creation of the Social, Economic, and Environmental Design (SEED) Network as a gathering platform for support and communication of professionals working or wanting to work with Public Interest Design¹⁸. All the projects developed by architects embodying public interest as their premise worked with participation, however, regarding social housing, no other methodology was claimed, for instance, the use of the open building, and/or self-help. Awan, Schneider, & Till (2011, pp.22) likewise, talk about Spatial Agency, which explores alternative practices for doing architecture, having autonomy and participation at the core of its applications. It puts the need of collaboration as a compelling resource, since “inevitably exposes the professional issues of power, and in particular of how power might be used, and how it might be abused.”

¹⁸ The SEED Network derived from the Design Corps program, founded by Bryan Bell and Victoria Ballard Bell in 1991. The non-profit organization was created to tackle the growing housing deficit for migrant farm workers in the area surrounding Raleigh, North Carolina. Due to the vast number of immigrant workers from Latin America, especially Mexicans, most of them have financial difficulties because they are subjected to the seasonality of their job; thus, "facing impoverished living and working conditions and a population that is segregated" (Awan, Schneider, & Till, 2011, p.138). The program facilitates access to decent housing by including “an application for a federal government grant can provide 50-100% of the construction costs, with the remainder of the costs being met by the farmer” (Awan, Schneider, & Till, 2011). Design Corps also has a participatory phase where the architects can understand needs particular to each farmer worker. Additionally, conditions for occupation are agreed with the farmers, resulting in a ten-year "contract where the farmer agrees to meet certain conditions for the standard of living of the workers in return for the new building" (Awan, Schneider, & Till, 2011, p.139). By having an active nature regarding their search for clients and funding to make their initiative happen, Bryan Bell (2008) honors what he preaches: the expanded role of the architect: the [pro] activist.

Elements of Participation: Definitions and Applications in Latin America

For the scope of the research, three concepts were analyzed and I defined them as elements of participation: open building, self-help, and participatory design. This definition was established for them as a whole because when collaboration applied in social housing projects, these elements always appear together.

Open Building

The concept of open building derives from the *Supports Theory*, developed by Nicholas John Habraken and published in English in 1972. The author developed a scheme to reintroduce the user in the decision process not only of the social housing design but also in other aspects of its production; professional and political. Recognizing that the users can decide about how to manage their dwellings but determining a clear separation between the knowledge involved – technical and non-technical -, a legitimate space for collaboration surfaces¹⁹ (Habraken, 1972).

Hence, the theory starts to form linking the *collective to act as a support*, and the *individual to act as an infill* (Kendall & Teicher, 2000). Support represents the

¹⁹ Frans van der Werf appears in this scenario as one of the most famous architects to work with open building in social housing. His most famous project, Molenvliet (1977) in the Netherlands, with 124 housing units for rent, was in the words of Habraken, “the first full-blown support/infill project realized” (Lamounier, 2017). Furthermore, Schneider & Till (2007) compiled in their book *Flexible Housing*, other projects from that continue to use the open building strategy, such as Next 21 (1993), a multi-story apartment building in Japan by Osaka Gas, and Pelgromhof (1998/2001), a four-to-six floors apartment block of 215 units located in Zevenaar, in the Netherlands, also by Frans van der Werf.

immutable part of an open building project, a "base building" (Kendall & Teicher, 2000) that receives the infill, which will act as a completely independent part serving the needs of the users, assuming multiple possibilities. Schneider & Till (2005; 2007), also noted that Habraken's system more than technical, it represented a tool for empowerment of the user in the design and appropriation of their home. Kendall & Teicher (2000) pointed out that open building is a definition that emerged following social, political, and market changes that claimed a better solution involving both decision-making and building development (see Figure 9). Costa (2016) developed a research about open building in Japan, using the concept as an international approach for multi-family housing production.

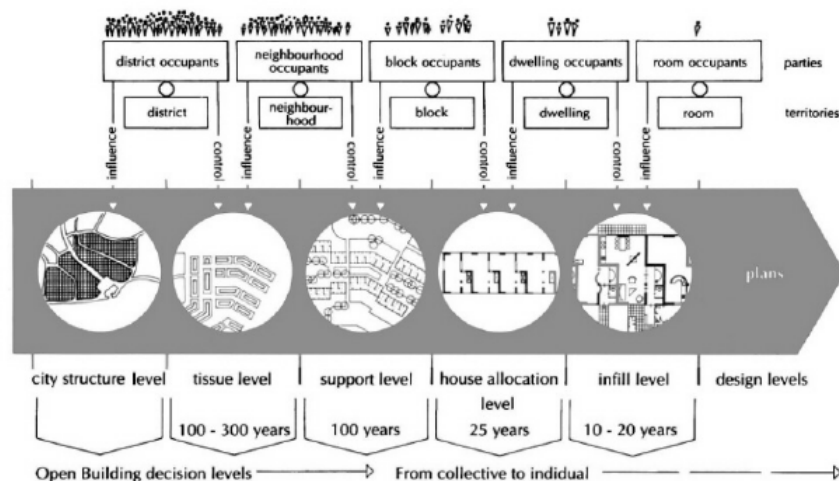


Figure 9: Levels of decision making, from collective to individual in the open building method. Reprinted from Kendall & Teicher (2000)

In Brazil, for instance, Denise Morado Nascimento coordinates the M.O.M, Morar de Outras Maneiras, (*Other Ways of Living*). Created in 2004, is a research group

from CNPq – Conselho Nacional de Desenvolvimento Científico e Tecnológico (National Council for Scientific and Technological Development) housed by the Graduate Program in Architecture and Urban Planning (NPGAU) of the School of Architecture of the Federal University of Minas Gerais (UFMG). The main focus of the group is to investigate the processes of dwelling production, their urban environment, and other quotidian spaces. By seeing architecture as an open process, interfaces and instruments are their preferred methodology to engage users in collaborative practices towards understanding their space of living (MOM, 2008). MOM also represents a contemporary generation of architects-researchers that produce the body of research discussing Open Building, and Self-Help as a desirable framework for the improvement of the provision of social housing, in their case, in Brazil. (Morado Nascimento, 2011; 2015; Lamounier, 2017)

They are also very proactive towards informal settlers of Belo Horizonte embracing the role of the architect as a mediator in the construction site, passing on the technical background needed for self-builders to arrange their homes better. As noted by Awan, Schneider, & Till (2011, pp.174):

MOM's interventions take on a political and ethical meaning: they influence processes by stepping in and affecting their cause through deliberation and negotiation. This is not about the solving of problems, but about posing problems so that all actors involved in the process develop their power to perceive and transform their built environment critically.

Finally, Lamounier (2017) proposed open building as a tool for aiding residents to achieve their desired spaces inside their houses. In her research, she defends the need for expansion in the homes delivered by the program *Minha Casa Minha Vida (My House My Life)*. She showed that self-help is characteristic to Brazilians citizens, who, at all income levels, customize their houses (Ward, 1976). A survey corroborated the importance of this practice she made amongst 18 homes in the metropolitan region of Belo Horizonte.

Self-Help

Self-help can be comprehended as the process by which inhabitants, not necessarily with technical knowledge, built and transform their space of living using their resources and executing the decisions without abiding by any code, building, or urban planning (Turner, 1976; 1982; Ward, 1972; 1976). Similarly, the *mutirão* is characterized in Brazil as a self-help process that occurs through community engagement. A group of people acts together to build a house, a school, a community center, or any other relevant building needed by the community (Ferro, 1969). By definition, an informal practice, self-help represents much more than that, since "a third of the world's people house themselves with their own hands, sometimes in the absence of government and professional intervention, sometimes despite it" (Turner, 1976, p.256). This affirmation was corroborated by Aravena & Iacobelli (2012, p.57) who revealed that in Chile for instance, "self-help will happen despite design and not thanks to it," and Morado Nascimento (2011;2015), who pointed out that 70% of the dwellings

in Brazil are self-build. Ward (1972; 1976) emphasized the fact that self-help crosses all income levels, not being a mere product of low-income classes due to the lack of government support in providing adequate housing and services. This statement brings awareness for the power of people in constructing the environment where they live, literally dwelling in the experience of their habitat. Thus, it is imperative to consider and use this power and how it leads to autonomy when creating a social housing project.

The terms *Incremental housing* and *Self-help* may seem equivalent, but in truth, they are concurrent with one another. Incremental means something that is achieved through phases, and when referring to the context of social housing, this translate as an expansion that will occur along with time, the time that a given family would need to evolve and expand their dwelling (Salingaros, Brain, & Duany, 2006). Thus, it separates from self-help when we comprehend that self-help means at the most basic sense, the construction of a house without any technical backing or orientation, and in some cases using materials that are leftovers from construction sites (Turner, 1972; 1976). Still, if a user has a house can be subjected to expansion – incremental -, when this user decides to expand, the incremental portion will be executed via self-help. That is why the research considers the terms concomitant.

Although in some Latin American contexts such as Brazil, Argentina, and Mexico, self-help and incremental construction are refuted based in the reason that code regulations would characterize an “unfinished” design as improper, in Chile, Aravena & Iacobelli (2012) successfully demonstrated that by understanding how to integrate the concept of flexibility can into policy and budget, proving that the approach is feasible.

By placing resources in the vital elements of a building - such as structure, wet areas -, that can grow both spatially and as an investment (Aravena & Iacobelli, 2012) rather than betting in frivolous standardization as a justification for economy, not only residents would be respected as clients but architecture would have its importance re-acknowledged. Additionally, from the World Bank to local communities, it is becoming evident that self-help practices are a more than valid approach to absorb both for the provision of housing and the upgrade of illegal settlements (Castillo & Hidalgo, 2007). Also, as cited before, in Peru, with the PREVI, and in Brazil, with the projects of Demetre Anastassakis²⁰ (1950 – 2019) and the USINA_ctah²¹, incremental construction

²⁰ The architect was one of the founders of Cooperativa dos Profissionais do Habitat (*Cooperative of Professionals of the Habitat*), a group that since 1990 works in social housing projects developed through a Constructivist methodology that leads to incrementality (Anastassakis, 1996). By using Lego blocks, sketches and computers, a framework of a module is created, generating infinite spatial arrangements that can easily be adapted to the users' needs. The construction technique of the team is a ceramic brick that when superposed act as loadbearing walls. Their most famous project was commissioned in 1993 inside the Favela Bairro Program, a set of houses for Complexo da Maré (*Maré's Complex*). In a 4,000 square meters lot, 80 housing units were built, occupying an area of 3,000 square meters: a density level of 1.315 inhabitants per hectare. All the houses allowed for direct expansion and also the construction of additional units, up until four stores using pre-existent spaces left with this purpose. The terraces can serve as patio or backyard depending on the expansion, and the high ground pavements always have a smaller area than those in the ground to ensure proper distribution of natural lighting (Anastassakis, 1996).

²¹ The USINA_ctah group, founded in 1990, is composed by 18 architects and urban planners that since 1990 have participated in the conception and execution of more than 5000 housing units (USINA, 2018), mainly in the states of São Paulo, Minas Gerais, and Paraná, in Brazil. Additionally, they have acted in the development of master plans for the urbanization of favelas and enabling the creation and organization of work associations. Their work intends “to overcome the authorial and strictly commercial production of architecture and urbanism and seeks to integrate and generate alternative processes to the logic of capital through social, spatial, technical and aesthetic counter-hegemonic experiences” (USINA, 2018). Amongst their projects, is the Urbanization of the Favela Senhor dos Passos, in Belo Horizonte, Minas Gerais. Commissioned in 1993 and finished in 1997, the project was financed and built in its first phase by the Municipality of Belo Horizonte (Urbel). However, due to economic setbacks only six buildings up to four floors were built from the original 32 envisioned without any collaboration with USINA for the construction phase. This project is relevant because it was supposed to provide only an initial 20 m² for each family, and through incremental construction via self-help they would arrive at 40 m², according to the design plans. (USINA, 2018) It marks the urbanization of an informal settlement through a collaborative project having steel frame as the base building for expansion, preceding Elemental's 2009

and self-help are possible when governments adjust their policies to fit the needs of a particular population. The fact that these practices are not yet fully backed by the governments as demonstrated in the summary table of housing programs, represent in the view of this research more of a lack of commitment of the governments and policymakers to the citizens in recognizing the need for changing and the embracing of theories that have been validated through many years by research. Furthermore, it also represents the fear of creating a correct housing policy and program rather than an economic one.

While self-help faces criticism from governments and sometimes from architects, regarding mostly its mode of operation, and how in some cases it can corrupt an architectural design. Thus, it is important to note that most of the architects and architectural firms that contribute to social housing research and projects use the users' knowledge, represented mainly through self-help, as critical factors of their approach²² (Hamdi, 1995; Hill, 1998; Brillembourg, Feireiss, & Klumpner, 2005; Aravena &

project in Iquique and being established as “a pioneer experience with steel frame in social housing project in Brazil” (USINA, 2018). The group would mature this solution in subsequent projects: Zilah Esposito (1993), and Mutirao Paulo Freire (1995).

²² Walter Segal (1907 – 1985) is an important reference in this regard. Famous for having designed a self-build housing system that was based on a timber frame construction. Even though the system was originally designed “as a cheap housing solution for his family” (Awan, Schneider, & Till, 2011, p.197), Walter Segal soon noticed that his idea had the potential to reach higher goals; it was durable and could offer enablement for people who wanted to build their own homes (McKean, 1987). The structure was used in London in the 1970s, where it took five years of negotiation with the city council to be permitted for construction. Having Jon Broome as a consultant, “the system used materials that were readily available and simple to work with and removed the need for any wet trades. Once the positioning of the timber frame and a services and circulation core are set, the standard size panels can be positioned according to user needs” (Awan, Schneider, & Till, 2011, p.197). Another application of the scheme was employed at the Technical University of Stuttgart, in a student housing building called Bauhäusle developed from 1981 to 1983.

Iacobelli, 2012). Hence, a reflection is required not on how self-help can be “adapted” to fulfill policy regulations but rather how governments understand this practice as natural in their context and provide policies and rules that converse and accept the approach.

The assumption of architect's role is clear; he is an enabler in all of the definitions that the word encompasses, an individual that acts as a facilitator in a social housing project providing an adaptable base building (Kendall & Teicher, 2000) made according to the residents' needs. “Flexibility is transformed into a social issue first and then an architectural one” (Schneider & Till, 2005, p.35) Also, the architect must disseminate architectural knowledge, through the participatory design phase, where users must understand the value of good architecture practice, such as cross ventilation, natural lighting, proper room dimensions, and more theoretical concepts like proportion, color, and tectonics. In the case of Quinta Monroy, Alejandro Aravena (2012), described this process of dissemination of architectural culture when discussing with residents what appearance they envisioned for their finished house. The answers revealed that the users desired a middle-class look, which the architect coined in his approach as a "DNA," encompassed mostly in size - 80 square meters -, and in appearance, for instance, the addition of a bay-window by the resident.

To McGuirk (2014), as well as to Aravena, the favelas inform thoroughly the direction that the architect needs to take:

Architects and planners will play a role, but they must channel the transformative potential of the slum dwellers. The essential tool of the activist is the agency. Here, the

architect is a creator of actions, not just forms. The form may or may not be important, but the one thing that the architect must do is create an opportunity to act. (McGuirk, 2014, p.73).

His consideration gave some clues concerning the role that the public sector would need to assume. It would need to revise its place in the social housing field, just like the architects, and along with policy changes, it would need to include the architect's honorariums as part of the process, linking this financial contribution with the phases necessary within the "new method to social housing": participation, program, construction site, and going even further, post-occupation. As for the architect, the Lei da Assistencia Tecnica Gratuita – 11.888/08 (*Law of Free Technical Assistance*) in Brazil, allows free public technical assistance for projects of houses of families with monthly income up to three minimum wages. It is a public resource fund that allows the hire of professionals of architecture and engineering for the construction of these houses. In Brazil, since 2017 the Council of Architecture and Urbanism (CAU) separates 2% of their annual budgets to finance initiatives of technical assistance in social housing. The law is an initial path towards the reinsertion of the architect in the field of social housing, yet, there is a need to bring this law into effect along with the housing programs because today its application is restricted to informal settlements.

Ultimately, amongst the authors who evaluated theory and policy applied to incrementality, Ferguson and Navarrete (2003), and Magalhaes (2016) observed that it is indeed feasible to relate more progressive policies with the low- to moderate income population.

Participatory Design

Participation as a general concept can be complicated (Sanoff, 1988), but also understood as a "categorical term for citizen power" (Arnstein, 1969, p.216), where this power is represented by the right to be included and to contribute in the activities that precede and follow the processes involved in social housing design. Through participation, citizens can "induce significant social reform which enables them to share in the benefits of the affluent society" (Arnstein, 1969, p.219). Historically, it can be traced first in England in 1956, with the Housing Act and the Skeffington Report of 1969 (Hamdi, 1995). In the United States, Sanoff (1988; 1990; 2010), described the multiple ways participation can be viewed, starting with the citizen participation in community decision-making represented in Plato's Republic that grew out to become one of the strongest concepts in American society.

Participatory Design can be traced back to Giancarlo De Carlo, initially within the Team X in 1956 and later in his 1969 manifesto, titled *Architecture's Public* (Barone, 2002; Barone & Dobry, 2004; Til; Jones, Petrescu, & Till, 2005). Nabeel Hamdi (1995) continued the exploration of the subject both in practice and in research. Schneider & Till (2007) highlighted that from the late 1960s, there was a growing number of projects being developed that encompassed the context of user empowerment and participation. Hamdi (1995, p.47), compared the thoughts of N.J. Habraken and John F. Turner in the matter by emphasizing that while Habraken considers participation as "an essential part of repairing the natural relationship between people and place", Turner embraces a

broader perspective, which places responsibility in governments, NGO's and the building industry to engage with the users.

Italian architect Giancarlo de Carlo was an important figure who appeared as one of the strongest critics of the Modern Architecture from the perspective of how transformative architecture really were under the movement's doctrines (Mumford, 2000; Barone, 2002; Barone & Dobry, 2004; Awan, Schneider, & Till, 2011). With an understanding of architecture as a social process (Barone., 2002), he was the central figure in formulating the discourse of participation related to architecture:

In my opinion contemporary architects must do everything possible to make architecture less and less the representation of its designers and more and more the representation of its users. (de Carlo, *An Architecture of Participation*, 1980, p.5)

In *an Architecture of Participation* (1980), the architect put forward what he believed to be a representation of architecture based on an authoritarian methodology, where a linear process of phases happens one after another: definition of the problem, elaborations of the solution, and evaluation of results. The logic presented is nothing else than a clear guideline followed by all architects when faced with a design challenge. The difference is precisely the absence of the client in the scheme; regardless of income level, its presence is *desired* mostly during the phase where the problem is established, as a source of information. That is this process can be characterized as authoritarian, because most of the times the information shared ends up erroneously interpreted by the influence of the values of the architect (de Carlo, 1980).

Instead, in a participation scenario the user(s) would be present during all the phases, and a free flow of exchange would happen constantly; processes would merge, and the design would be generated from these interactions. “The designer’s job would be no longer to produce finished and unalterable solutions, but to extract solutions from a continuous confrontation with those who will use his work (...) architecture should facilitate the human need to communicate through self-representation” (de Carlo, 1980, p.6). Hence, architecture would have an open-ended result, a work where the subjects carried more importance than having a completed signature product (Barone, 2002). De Carlo’s posture towards design process and construction in the 1960s shows the beginning of a new type of architecture professional, the (re)emergence of the theme of architecture. Barone (2002) emphasized that the desire to create projects designed specifically to a community through participation also represented a political stand against the State, which at that period was massively intervening in social housing projects. Yet, although initiatives in social housing that involve participation carry a political weight until today perhaps it is time to consider participation as inherent to the architecture profession; it is time for this practice to be the rule, not the exception, and especially not only part of a political agenda.

Along with his bold vision for the profession in the 1960s, another point makes de Carlo extremely relevant; the awareness that participation does not have only the side of including people in the process, but is also leads to an opportunity for the architect to enhance the design culture of the community, expanding the access to architecture while understanding what works best for their place. To him habitat related with belonging,

and this relation between house and place would define identity (Barone, 2002). This dissemination of architectural culture is one of the most important roles that the contemporary architect needs to embrace, the need to propagate acceptable practices, or as Bell (2004; 2008) remarked: “to design for the 98% of the population”.

The concept gained a refreshed look in practice that lead to updated literature in Latin America with Alejandro Aravena, who in 2003 started developing projects in his office ELEMENTAL embedding the philosophy of participatory design in allowing users to contribute to their dwellings following an architectural rationale (Aravena & Iacobelli, 2012). Aravena's contribution embodied not only participation but also open building concepts, in what he called the "half-house" (p.17). While the architect claimed not to have based his method from any of Habraken's theories, his contribution is relevant. It represents an innovation because he was able to identify through participation the main constructive elements necessary for the Chilean population²³.

²³ Aravena identified five design conditions that needed to be prioritized when building the “half-house”: a good location, well thought urban layout of the units, full house structure, stairs and wet rooms, and the possibility of a “middle class DNA” when the house was expanded and finished. (Aravena & Iacobelli, 2012)

CHAPTER III

METHODOLOGY

The study developed a theoretical analysis by using a combination of two research strategies; logical argumentation and case studies (see Figure 10). Logical argumentation connects, explains, and establishes the whole argument of the investigation since its primary purpose is to frame the reasoning in a system that has broad explanatory applicability (Groat & Wang, 2002). Logical argumentation was chosen because this research aims to change the way architects position themselves by developing a framework for thinking and designing social housing projects incorporating open building, self-help, and participatory design. The current way acts as *a priori* condition (Groat & Wang, 2002), resulting in the exclusion of both the architect and the user from the production of social housing in the context of Latin America (Balchin & Stewart, 2001; McGuirk, 2014; Lamounier, 2017). This change is then presented as a framework, a *treatise* that has, in its core, the role in transcending contexts, being able to have appeal beyond the scope of this study (Groat & Wang, 2002).

Case studies complemented the assessment of the theoretical concepts proposed as a framework for social housing, establishing a calibration parameter for future projects. Project selection derived from a timeline highlighting relevant discourse, architects, and projects. Moreover, the timeline showed moments of pivotal change²⁴ regarding social

²⁴ Pivotal change in this study refers to an event, theory, architect, or project that influenced globally the architectural discourse in Latin America.

housing, elements of participation, and Latin America occurring approximately every 30 years. The case studies were analyzed individually and independently from one another since they differ on location, historical period, and construction technique. Thus, these cases' classification is *instrumental* because each serves a specific purpose inside the scope of research concerning the theory related particularly to them, nonetheless being able to establish points of generalization. (Yin, 1994; Stake, 1995; Mills, Durepos, & Wiebe, 2010).

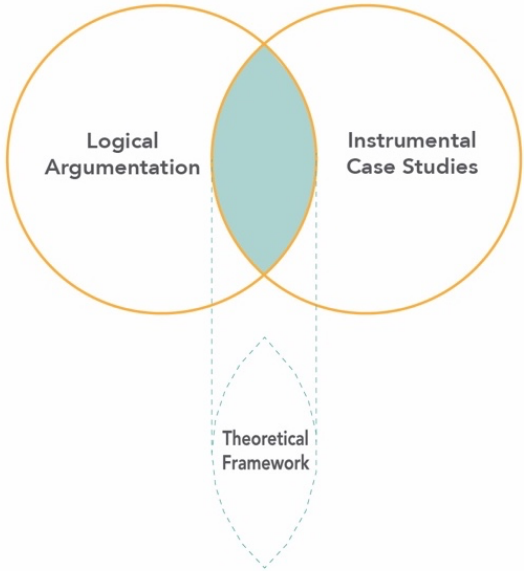


Figure 10: Diagram showing the research methods employed in this study

Timeline and Instrumental Case Studies

The timeline showed below in Figure 11 prioritized events, discourse, theory, and projects that were pertinent to the discussion of social housing and elements of

participation. It spans from 1914 until present time (2020), totaling 106 years. The pivotal change years and events considered by this study are:

1. **1914**: design of the Maison Dom-Ino by Le Corbusier;
2. **1926**: construction of Quartiers Modernes Frugès (PESSAC) by Le Corbusier;
3. **1974**: construction of Villaggio Matteotti, by Giancarlo de Carlo;
4. **2003**: construction of Quinta Monroy, by Alejandro Aravena.

The selection of the aforementioned projects as the instrumental case studies of this dissertation observed the global impact that each of them had within their theoretical framework, and the radius of influence in the discourse for Latin America. A summary of the case studies, displayed in Table 2, introduces their importance for the study of social housing.

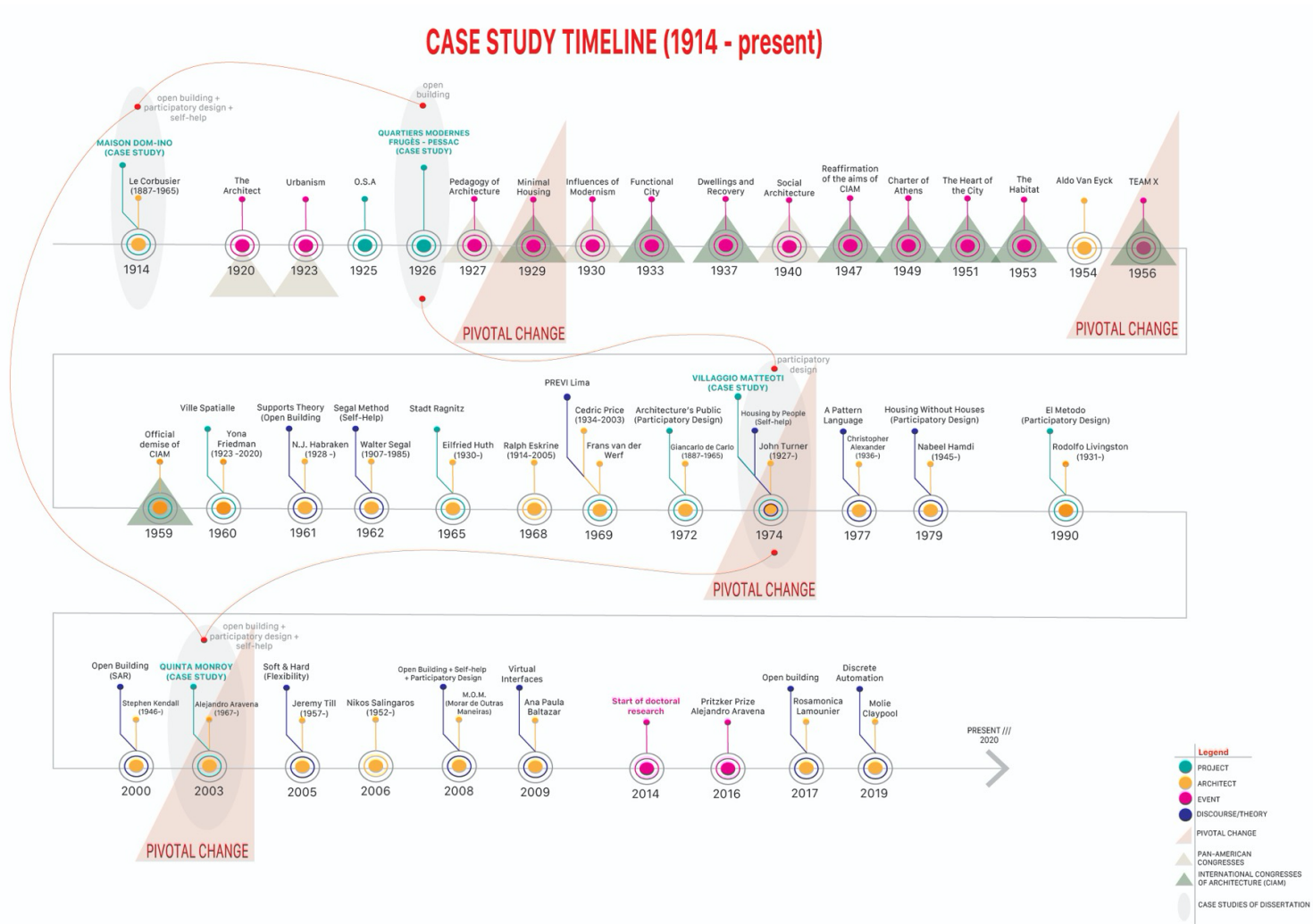


Figure 11: Timeline showing the historical trend of architects and discourse for the selection of the case studies based on the literature review

INSTRUMENTAL CASE STUDIES /// SUMMARY TABLE

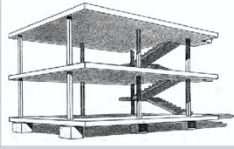



PROJECT	YEAR	LOCATION	ARCHITECT	PIVOTAL CHANGE
Maison Dom-Ino	1914	N/A (Unbuilt)	Le Corbusier	<p>Presented as the building prototype for mass production. Considered a "Support" structure by Habraken (1972), embodied flexibility of plan, composition, and principles of self-help. In the words of Corbusier (1919, pp.xx) "a bone structure that can be filled with wherever the users may need." Became the typology of the <i>favelas</i> (Lara, 2011; McGuirk, 2014).</p> 
Quartiers Modernes Frugès - PESSAC	1926	Bordeaux, France	Le Corbusier	<p>Developed from Maison Dom-Ino's module, was the first housing project to incorporate the five points of Modernism from Corbusier, only theoretical at that point. The project has a modular system resulting in different typologies. Considered by Boudon (1979) an example of open building, with a free plan that allowed appropriation by its residents.</p> 
Villaggio Matteotti	1974	Terni, Italy	Giancarlo de Carlo	<p>First project where Giancarlo de Carlo employed his theories of participatory design. Developed after a six-phase participatory process which involved a series of meetings with prospective residents. The project materializes the discourse initiated by the architect on TEAM X (1956/59) and on Architecture's Public, his manifesto.</p> 
Quinta Monroy	2003	Iquique, Chile	Alejandro Aravena ELEMENTAL	<p>First social housing project built in Latin America under a governmental program (Chile Barrio) encompassing open building, self-help, and participatory design. Embodies concepts from Maison Dom-Ino, such as the frame, and reinstates the discourse of the citizen architect and social architecture.</p> 

Table 2: Summary table showing the case studies and their relevance based on the literature review

Data Collection

The projects were analyzed independently as case studies. Sources for the collection of data encompassed documentation²⁵ (books, journals, architectural magazine articles, news clippings, administrative documents), archival records²⁶ (publicly available databases, maps, charts, users' interviews, and post-occupation survey data related to the case studies), and physical artifacts²⁷ (architectural drawings of site plan, floor plan, and façade). The collection and organization of data followed the structure proposed by Yin (1994, pp.102) to ensure proper examination of the case studies:

- Consider three sources of evidence;
- Triangulation of evidence from different sources;
- Create a comprehensive database for each case study;
- Maintain chain of evidence;
- Exercise care when using electronic sources.

²⁵ Defined by Yin (1994, p.105-107) as a relevant source, because they “corroborate and augment evidence from other sources, playing an explicit role in any data collection in doing case study research.”

²⁶ These records can be used “in conjunction with other sources in production of a case study, with its usefulness varying from case to case” (Yin, 1994, p.109).

²⁷ “An important component in the overall case.” (Yin, 1994, p.117). In this dissertation, the architectural drawings are crucial for the analysis because they materialize theoretical framework of the architect, acting as unbiased evidence.

Data Organization

After the definition and collection of the data sources for each case study, the information was organized into five main categories:

1. Historical context
2. Site context
3. Architectural theory
4. Project analysis
5. Architectural drawings and other artifacts

Data Analysis

The case studies' examination followed two structured phases, as demonstrated in the diagrams below (see Figures 12 and 13). Phase one focused on constructing the “macro” picture of each project, creating a matrix of categories and distributing the evidence amongst them, observing the following aspects: historical context, site context, and architectural theory. Phase two concentrated on composing the “micro” picture: developing a project analysis and evaluation of architectural drawings and other artifacts, creating data displays²⁸ that measured the performance of each case study under the participation spectrum²⁹.

²⁸ Formal analytical diagrams and radar charts.

²⁹ This method will be detailed in the next section of this document.

Thus, the two phases of the data analysis followed an *explanation building* technique, analyzing the data by explaining each case study and observing stances of pattern matching (Yin, 1994).

PHASE #1 /// macro picture

HISTORICAL CONTEXT

Comprised the description the moment in history where the project was developed. Observed relevant architectural style trends that may have influenced the architect's design approach.

SITE CONTEXT

Contained the account of the project site, its location, and surroundings. Observed neighborhood history, income level, cultural and regional characteristics pertinent to the project's design.

ARCHITECTURAL THEORY

Encompassed the description of the theoretical framework applied in the design conception.

PHASE #2 /// micro picture

PROJECT ANALYSIS

Covered relevant aspects of the case study's architectural character, typology, and how it related with the theoretical framework considered by the architect.

PARTICIPATION SPECTRUM ANALYSIS

Included a spatial and quantitative evaluation of the project's performance within the theories defended in this study: open building, self-help, and participatory design.

Figure 12: Phases of data analysis

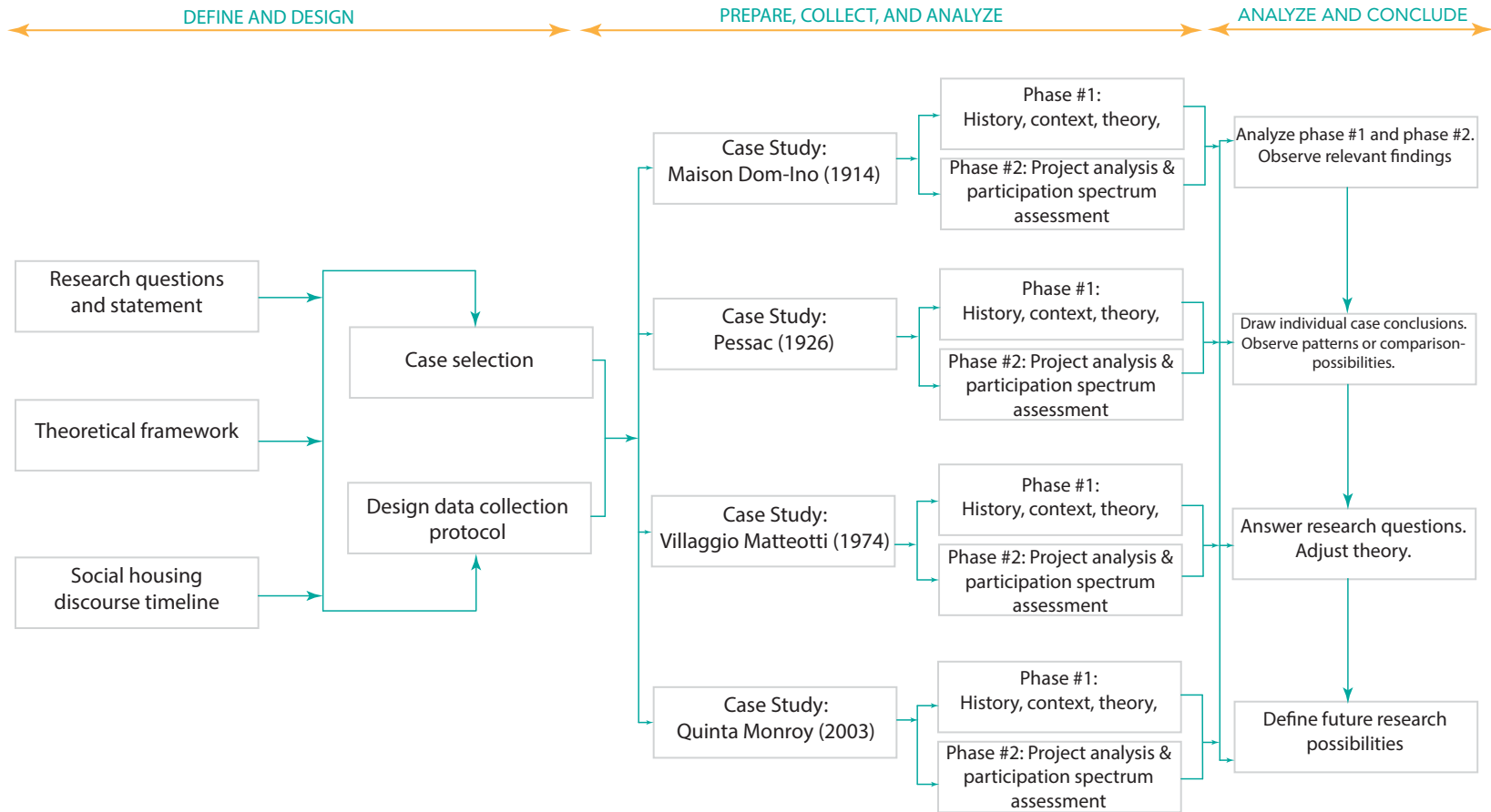


Figure 13: The case study design model employed in the dissertation. Adapted from Yin (2014)

The Participation Spectrum

The participation spectrum is a category of evaluation developed for the second phase of analysis of the case studies. The concepts named in the category appeared in literature as the most relevant within open building, self-help, and participatory design (Turner, 1976; Aravena & Iacobelli, 2012; Lamounier, 2017). The participation spectrum encompassed *typology*, *belonging*, *inclusion*, and *autonomy*, which expanded in the following components: *interior + exterior*, *urban insertion + urban composition*, *needs program*, *aesthetics + design*, as shown in Figure 14.

While each case was analyzed individually, as natural conditions in any design project, those parameters were also cross-compared amongst the selected projects in search of theoretical insights.

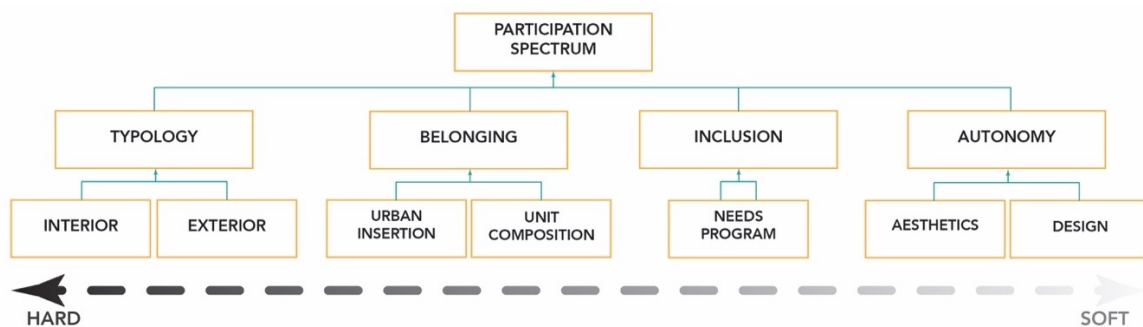


Figure 14: Diagram showing the levels of participation established for the analysis of the case studies

Participation Spectrum Variables

The **site plan, floor plan, and facade** were the variables of analysis on each of the case studies for their performance on participation (see Table 3). The investigation considered how the variables complied with the referred theory. Compliance values ranged from 0% to 50% and were measured by calculating ratios for each variable. After gathering the percentages for each variable, the values were transposed using the **Soft & Hard point scale**.

PARTICIPATION SPECTRUM				
THEORIES	CONCEPTS	ANALYTICAL COMPONENTS	PERCENTAGE	VARIABLES OF ANALYSIS
OPEN BUILDING /// SELF-HELP /// PARTICIPATORY DESIGN	TYPOLOGY	INTERIOR	0-50	FLOOR PLAN
		EXTERIOR	0-50	FAÇADE
	BELONGING	URBAN INSERTION	0-50	SITE PLAN /FLOOR PLAN
		UNIT COMPOSITION	0-50	SITE PLAN /FLOOR PLAN
	INCLUSION	NEEDS PROGRAM	0-50	FLOOR PLAN
	AUTONOMY	AESTHETICS	0-50	FLOOR PLAN/FAÇADE
		DESIGN	0-50	FLOOR PLAN/FAÇADE

Table 3: Table depicting the variables for the analysis of each case study

Soft and hard (Schneider & Till, 2007)

Soft and Hard is a parameter created by Schneider & Till in their book *Flexible Housing* (2007) for analyzing levels of flexibility. It is a theoretical classification in which soft refers to flexible solutions that allow space for indeterminacy. Hard applies when projects' flexibility is structured with elements linked more specifically to the way the design may be used (Schneider & Till, 2007). In soft approaches, the user has more control over the complete design (plan, interior, exterior) with the architect acting in the background. For hard uses, the architect takes the lead in the process, regulating the use, size, and overall appearance of the project.

Schneider & Till (2007) only offered this classification abstractly in their book. This research expands its concept, by adding a numerical scale to transform theory to data for the case studies, as shown in Figure 15. This decision also came to materialize the conceptual aspects of the selected projects graphically within their diversity beyond the scope of architectural description in a manner to highlight their limitations and strengths. The scale ranged from minus five (-5) to five (5). The negative side did not stand for a negative result; it only denoted approaches where the architect's control over the whole design was higher. It is also important to realize that in this case, the zero value (0) did not mean balance, but instead, the representation of the departure point of the projects, from where they started. to which score they reached within their final solutions.

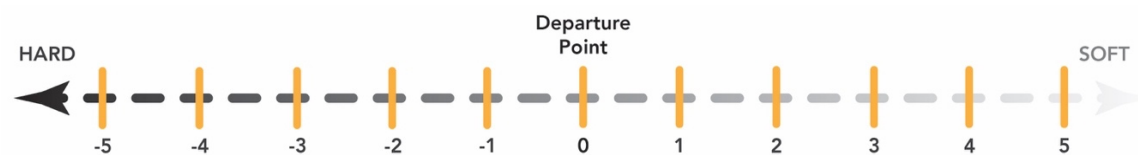


Figure 15: Point scale for hard and soft

Soft and hard point scale rubric

The rubric shown below in table 4 represents the percentages considered for the Soft and Hard scale, aligning them from the total level of control by the architect (HARD) to the shared decision-making process (SOFT), or the 50/50 approach (Aravena & Iacobelli, 2012). It is essential to clarify why the scale starts from 50% within the understanding of the shared process between architect and user and not 0%; for the scope of the study, 100% user control represents the total exclusion of the architect from

the production of social housing, as we can see in favelas³⁰. The study acknowledges the favela as the embodiment of people's lack of access to basic needs and their right to the city (Maricato, 1996), and their undeniable capacity for self-organization³¹(Lefebvre, 2009). However, it also aims to show that the architect is an essential figure in society who must act not only as an enabler (Turner, 1985) and as a disseminator of architectural culture (Bell, 2004; 2008).

BALANCE	SCORE	HARD & SOFT SCALE
100% ARCHITECT	-5	Full control; Architect has total power of decision (HARD)
90% ARCHITECT 10% USER	-4	↑
85% ARCHITECT 15% USER	-3	
80% ARCHITECT 20% USER	-2	-
75% ARCHITECT 25% USER	-1	
70% ARCHITECT 30% USER	1	-
60% ARCHITECT 35% USER	2	
65% ARCHITECT 40% USER	3	↓
55% ARCHITECT 45% USER	4	
50% ARCHITECT 50% USER	5	Shared process of decision or highest level of flexibility (SOFT)

Table 4: Table showing the rubric for the Soft & Hard point scale

³⁰ This study defines favelas as self-built informal settlements across Latin America (Lara, 2011; McGuirk, 2014).

³¹ Lefebvre (2009), defined this capacity of self-organization and structured governance as autogestion.

The combination of the participation spectrum, variables of analysis, and Soft & Hard scale resulted in the case study analysis Table 5 shown below, which demonstrate the performance of each case study regarding participation. The table is complemented by formal analysis diagrams and a radar chart, which has the quality to show variables distribution.

PARTICIPATION SPECTRUM - CASE STUDY ANALYSIS				
CATEGORIES	COMPONENTS	SOFT & HARD	VARIABLES OF ANALYSIS	PERCENTAGE
typology	Interior	from -1 to 5	FLOOR PLAN/SECTION	from 0 to 50%
	Exterior	from -1 to 5	SECTION/FAÇADE	from 0 to 50%
belonging	Urban insertion	from -1 to 5	SITE PLAN /FLOOR PLAN	from 0 to 50%
	Unit composition	from -1 to 5	SITE PLAN /FLOOR PLAN	from 0 to 50%
inclusion	Needs program	from -1 to 5	FLOOR PLAN	from 0 to 50%
autonomy	Aesthetics	from -1 to 5	FLOOR PLAN/FAÇADE	from 0 to 50%
	Design	from -1 to 5	FLOOR PLAN/FAÇADE	from 0 to 50%

Table 5: Case study analysis table combining all the concepts and variables

This analysis demonstrates how the case studies data transpose to the participation spectrum table. In each of the projects, the percentage of space allocated for the contribution of the architect and the user was obtained through ratio calculation of the variables of analysis (*site plan, floor plan, and façade*). The formal analysis diagrams show highlighted in red, areas where the user shares decision control with the architect, along with the percentage that this area represents. Applying the values to the participation spectrum table following the rubrics, as mentioned earlier, generates the radar chart demonstrating how the case study performs in each category and the overall spectrum.

Anticipated Results

The anticipated results of this research are:

1. The assessment of the capability of the elements of participation³² in optimizing social housing design and enhancing the sense of place of inhabitants.
2. From the case study analysis, the determination of an adaptable theoretical framework that can serve as a guide to architects and users in all phases of a social housing project.
3. The acknowledgement of the contemporary roles of architects and users within the field of social housing.

³² Open building, self-help, and participatory design.

CHAPTER IV
CASE STUDY ANALYSIS

Introduction

To answer the research questions, the case study analysis happened on two phases, focusing on the following aforementioned categories:

- | | | |
|------------------------------------|---|----------------|
| 1. Historical context | } | Phase 1 |
| 2. Site context | | |
| 3. Architectural theory | | |
| 4. Project analysis | } | Phase 2 |
| 5. Participation Spectrum Analysis | | |

Maison Dom-Ino (1914)

Possibly one of the most thought-provoking schemes in the history of Modern architecture, the drawings of Maison Dom-Ino developed by Le Corbusier represented not only a scheme that would influence perhaps forever the principles of housing construction, but also the first emergency housing purposefully conceived as such (Frampton, 1980; Curtis, 1982). Maison Dom-Ino is therefore a canonical project for social housing due to its essential yet poetical idea.

Historical context

It is a fact that the idea of mass-production envisioned by Corbusier in his *Towards a New Architecture* manifesto of 1928 has been wholly corrupted and transformed into a perverse way of producing social housing in Latin America. However, when reading his reflections about the timeless housing problem and the promise of mass production, I see the clear intention of making this system democratic to the users. Moreover, I envision the search for a new definition of user aesthetics, particular to his/her understanding of the housing typology.

The problem of the house is a problem of the epoch. The equilibrium of society today depends upon it.

Architecture has for its first duty, in this period of renewal, that of bringing about a revision of values, a revision of the constituent elements of the house.

Mass production is based on analysis and experiment.

Industry on the grand scale must occupy itself with building and establish the elements of the house on a mass-production basis.

We must create the mass-production spirit.

The spirit of living in mass-production houses.

The spirit of conceiving mass-production houses.

If we eliminate from our hearts and minds all dead concepts in regard to the houses and look at the question from a critical and objective point of view, we shall arrive at the 'House Machine', the mass-production house, healthy (and morally so too) and beautiful in the same way that the working tools and instruments which accompany our existence are beautiful.

Beautiful also with all the animation that the artist's sensibility can add to severe and pure functioning elements. Corbusier (1928, p.227)

Designed in 1914 by Le Corbusier serving as a response to the devastation and housing deficit resulted from the World War, it was a prototype of prefabricated

structure for mass production while encompassing the central premises of the Modern Movement (Corbusier & Jeanneret, 1948). The Maison Dom-ino was conceived using the frame as its main feature: an independent component that carried floors and staircases (Corbusier & Jeanneret, 1948). Curtis (1982) describes the prototype consisting of:

(...) three horizontal slabs, smooth below and above, each of the upper two supported on square sectioned posts of concrete, the lower level lifted from the ground on squat concrete blocks. (...) Employing the principle of the cantilever, the slabs, moreover, extended well beyond the line of supports. (p.47)

The initial scheme allows multiple combinations, making it possible to adapt to different site conditions (see Figure 16). Its "beam-column" construction system (*Sistema viga-pilar*) still resonates today in Latin American construction, especially on informal settlements³³.

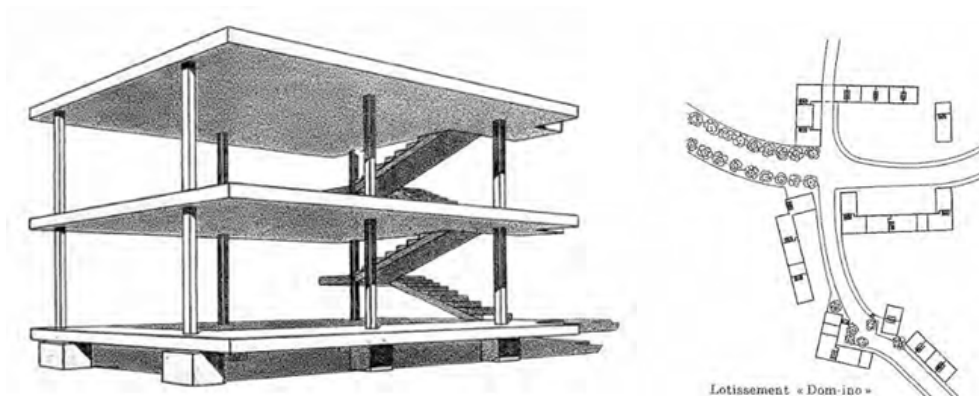


Figure 16: Representation of Maison Dom-ino (1914), by Le Corbusier, as a module and clustered in a site proposition. Reprinted from Corbusier & Jeanneret (1948)

³³ Maison Dom-ino's influence in Latin American construction was discussed in the Literature Review.

Site context

This category of analysis for the context of Maison Dom-Ino has similarities with Yona Friedman's Villa Spatiale (1960) in the sense that it is a scheme that can easily work for any site condition. The slight elevation from its foundation can adapt to any topography, and its modular constitution allows for infinite combinations, exploring diversity both in urban fabric porosity and unit aggregation, as displayed in Figures 17, 18, and 19.

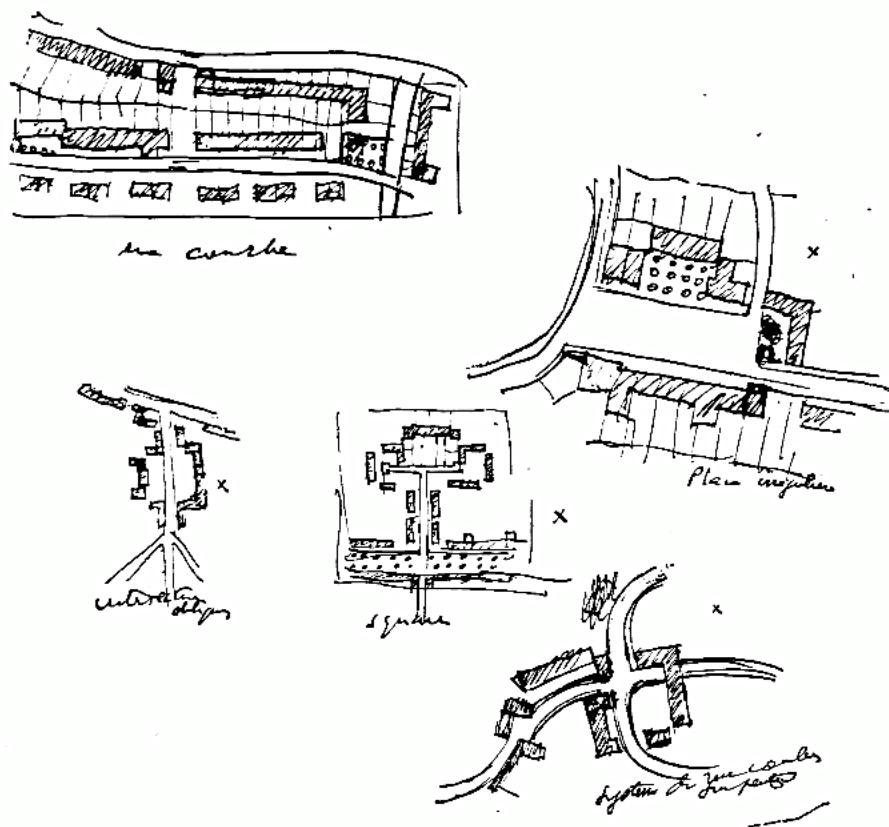


Figure 17: Distinct site applications ideas for Maison Dom-Ino (1914), by Le Corbusier. Reprinted from Corbusier & Jeanneret (1948)

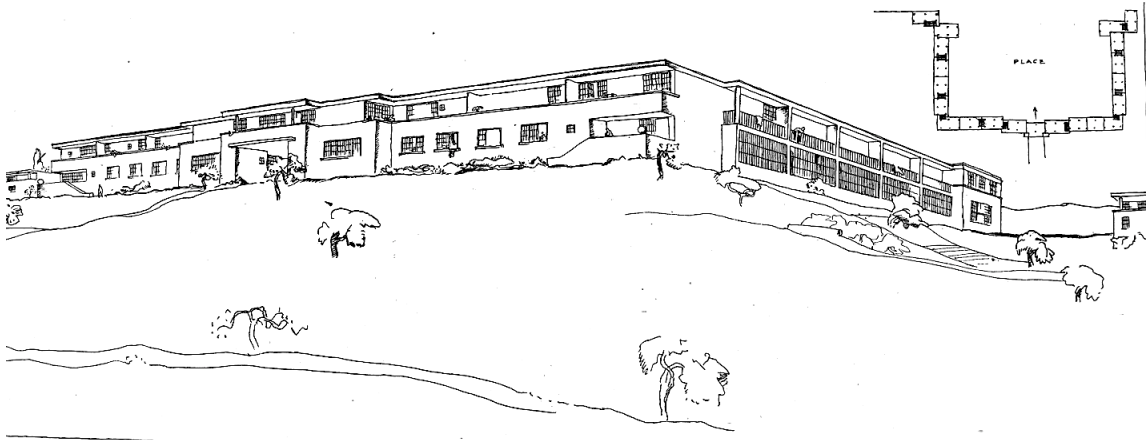


Figure 18: Volumetric possibilities of Maison Dom-Ino in a serial organization. Reprinted from Corbusier & Jeanneret (1948)

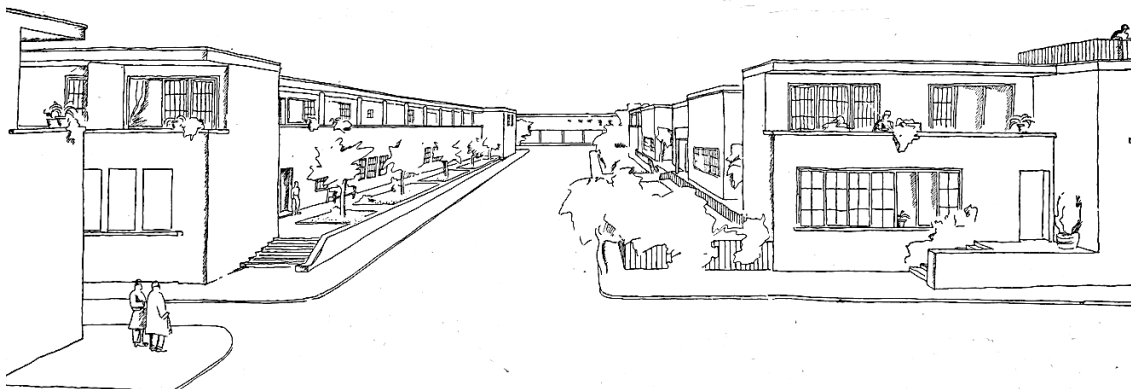


Figure 19: Volumetric possibilities of Maison Dom-Ino (1914), by Le Corbusier, in a serial organization. Reprinted from Corbusier & Jeanneret (1948)

Architectural theory

Analyzing the architectural theory of Maison Dom-Ino is two transit between its dual condition of both diagram and architectural scheme. In my understanding, for Le Corbusier, the idea of Dom-Ino was always an architectural proposition rather than just a

formal speculation. However, the critics tend to evaluate the project either for its architectural representation or its meaning for the discipline.

Colin Rowe emphasized the transcendental value of Dom-Ino for architecture by saying:

Le Corbusier's drawing for the Dom-Ino House represents precisely such an evaluation; and is perhaps the perfect illustration of the meaning of the frame for the International Style. **What we have here is not so much a structure as an icon, an object of faith which is to act as a guarantee of authenticity, an outward sign of a new order,** an assurance against lapse into private license, a discipline by means of which an invertebrate expressionism can be reduced to the appearance of reason. (Rowe, 1966, p.137)

Peter Eisenman (2014), argued the meaning of Dom-Ino as a plan and section diagram and its reading as symbol:

As a plan and a section diagram, Dom-Ino seems a rather simple and straightforward statement. Perhaps for this very reason - its apparently extreme clarity - it is often taken as an icon and a structural paradigm, an example of the potential of the then new technology, a prototypical unit expressing ideas of mass production, repetition, and so on. (p.142)

Furthermore, through the formal analysis of the Dom-Ino diagram, Eisenman made perhaps one of the most impactful interpretations of the project: its self-referential quality. "Its existence as an architecture about architecture" (Eisenman, 2014, p.141).

In contrast, Antoine Picon (2014), discussed the technical implications of the drawings presented by Corbusier, justifying that the ambiguousness of the architect's schemes place Dom-Ino almost as a fictional element. The author presents the possibility

of the project to be a blank page of architecture, yet stressing that even in this condition Dom-Ino is “both anterior and already architectural” (p.172). Furthermore, it alludes to a prospect that bears much validity today in Latin America; the absence of the architect in social housing: “in such a world the architect can either be everywhere, as a universal promise of architecture, or nowhere, should his agency be denied³⁴” (p.175).

Project analysis

It is important to analyze the Dom-Ino scheme from three distinct points of view: past, present, and future. When first conceived in 1914, it was entirely based to be a system of parts subordinated to its frame, an open building system: “the seminal image in defining the distinction of support and infill” (Schneider & Till, 2007, p. 166). Furthermore, it had an inherent anarchist proposition for housing, being able to also incorporate self-help construction. Figure 20 shows the variety of applications possible for the project. In my opinion, Corbusier’s description of the Dom-Ino system does not show a dictatorial master with a desire to standardize, but rather, a theorist in search of an effective meaning for housing:

We therefore designed a structural system - **frame - completely independent of the functions of the plan of the house: this frame simply supports the floors and the staircase.** It is manufactured as standard elements, which can be combined with each other, which **allows great diversity in the grouping of houses.** This reinforced concrete is made without formwork; to tell the truth, it is about a material of special building site which makes it possible to pour the floors definitively smooth above and

³⁴ It is important to highlight here that the architect’s agency in Latin America was not denied, but rather neglected by the way that the social housing is treated in the region; as an economic program rather than a tool for the improvement of people’s lives.

below by means of a very simple scaffolding of double T joists temporarily hung on clamps which are fixed at the top of each post: **the concrete posts are cast on site and dressed with the formwork system for oriented and grouped frames at the request of the urban planner or, more simply, of the client.** (Corbusier & Jeanneret, *Oeuvre Complete, Volume 1, 1919-29, 1948, p.23*)

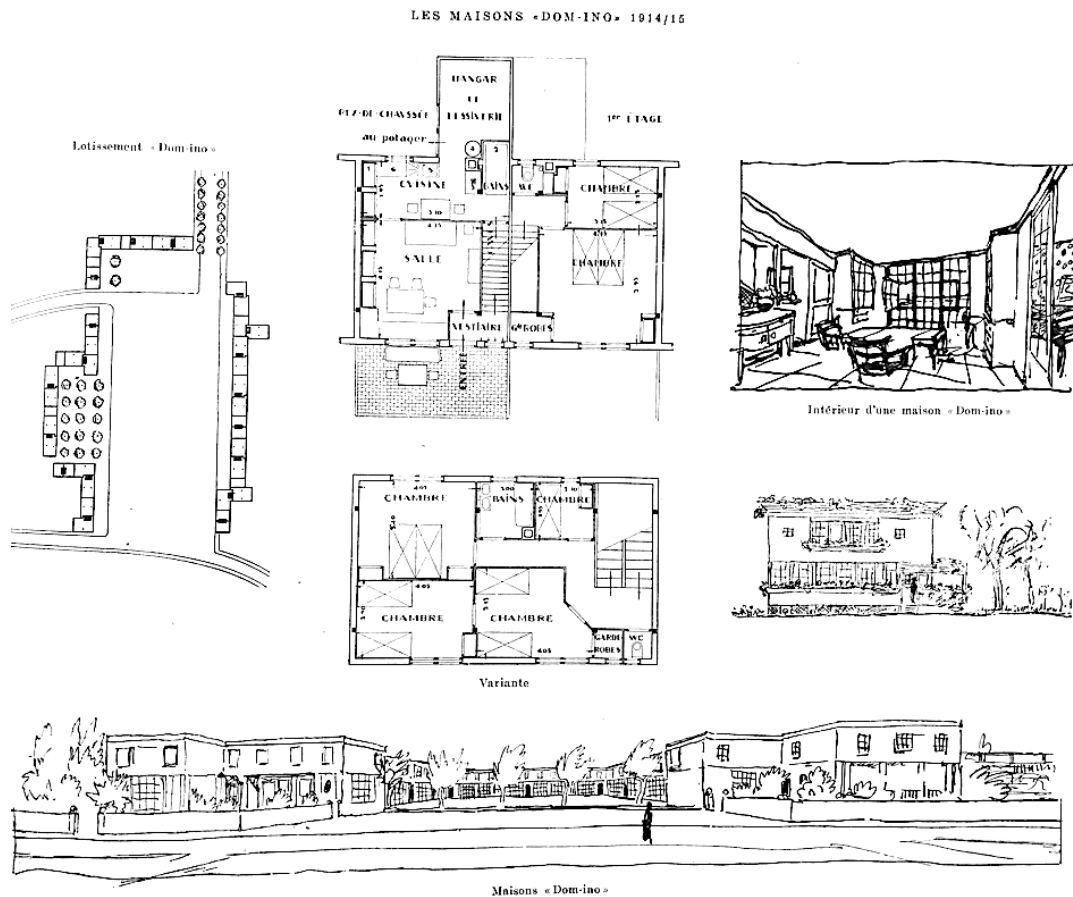


Figure 20: Le Corbusier's drawings investigating possibilities of organization in plan and site for Maison Dom-Ino in 1914. Reprinted from Corbusier & Jeanneret (1948)

Thinking about the present in the context of Latin America, the Dom-Ino frame has become more than just a scheme, but a tool for the dissemination of architectural culture. As cited before by Lara (2011; 2018) and McGuirk (2014), the scheme

multiplies itself *ad nauseum* in favelas (see Figure 21), but also serve as the basis for housing at all income levels.

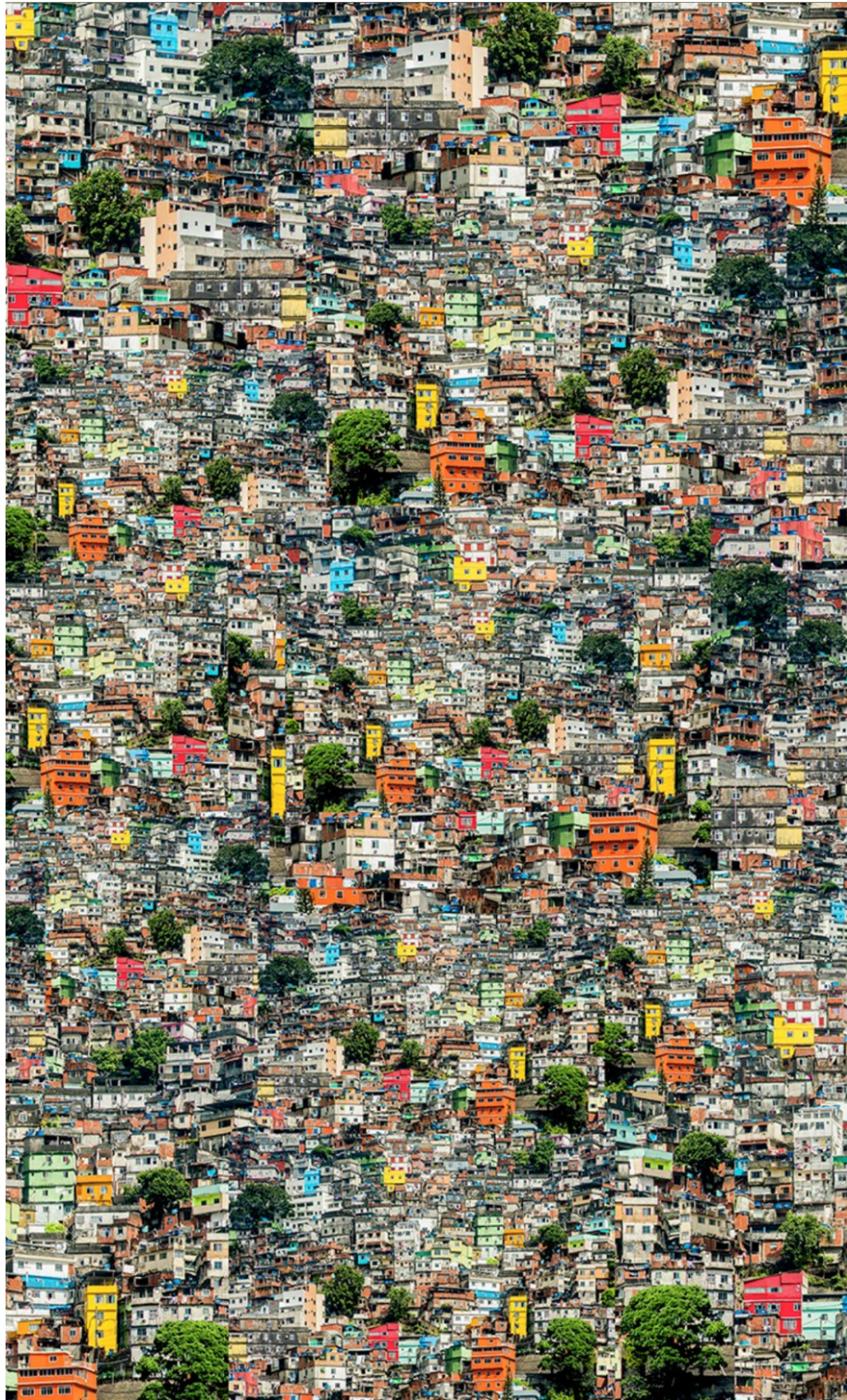


Figure 21: A sea of Dom-Ino interpretations at Favela da Rocinha in Rio de Janeiro. Photo credit Luiz B. Hering, “Resistance”: *Serie Urbanidades* (2019) at <https://www.luizbheringfoto.com>

Finally, observing the way in which Corbusier incorporated mass production for Dom-Ino within an automated interpretation, establishes a part-to-whole relationship subordinated to the frame. This intention was clear when he said:

We imagined the disaster victims establishing on their own initiative six, twelve or eighteen foundations that were perfectly leveled and ordering from the Sister Company the various items necessary for the equipment of the house, then, with means of makeshift and with their own manual forces, the victims set up their own houses. There were no technical worries left there was no need for a specialist everyone could build their own house at will. Despite the individualism of these initiatives, the technical process itself brought fundamental unity and ensured the villages which would be reconstructed in this way, with architectural certainties. The technique allowed to manifest a new feeling of architectural aesthetics. (p.24)

Looking to the future, this relationship connects the project with the notion of Discrete³⁵, a contemporary strand of design research that investigates the possibilities of exploring part-to-whole relationships through computational design, while establishing a de-hierarchization of the system.

Participation spectrum assessment

Using the soft & hard score rubric provided for the participation spectrum³⁶, the performance assessment for Maison Dom-Ino was based on the schematic floor plan and

³⁵ Retsin (2019) discussed the application of Dom-Ino as a Discrete framework and parametric structure, exploring ramifications of the part-to-whole system using computational design.

³⁶ The soft & hard point score, and participation spectrum rubrics were explained at the Methodology chapter of this document and can be found on pages 64 and 65.

section generated by Corbusier. To establish a spatial understanding of how the elements of participation can function in the project, I generated analytical diagrams³⁷.

This analytical representation allowed me to have precision calculating the project's ratio of area permitted for the users to appropriate, and thus, apply this percentage according to the soft & hard point score.

The diagrams displayed below on Figures 22 and 23 display three levels of information for Maison Dom-Ino:

1. The projects' floor plan (the generator), displayed in black and white;
2. The modular organization (the frame), shown in red;
3. The distribution of areas where users can appropriate the design, presented in two shades of gray. The lighter shows area subject to appropriation whereas the darker displays fixed spaces, immutable in the design.

³⁷ The analytical diagrams were a tool for understanding the projects in a formal and unbiased level. I derived the aesthetics of my diagrams from Colin Rowe's comparative formal analysis of Palladio's Villa Rotonda and Le Corbusier's Villa Garches presented in his book *The Mathematics of the Ideal Villa and other Essays* (1966).

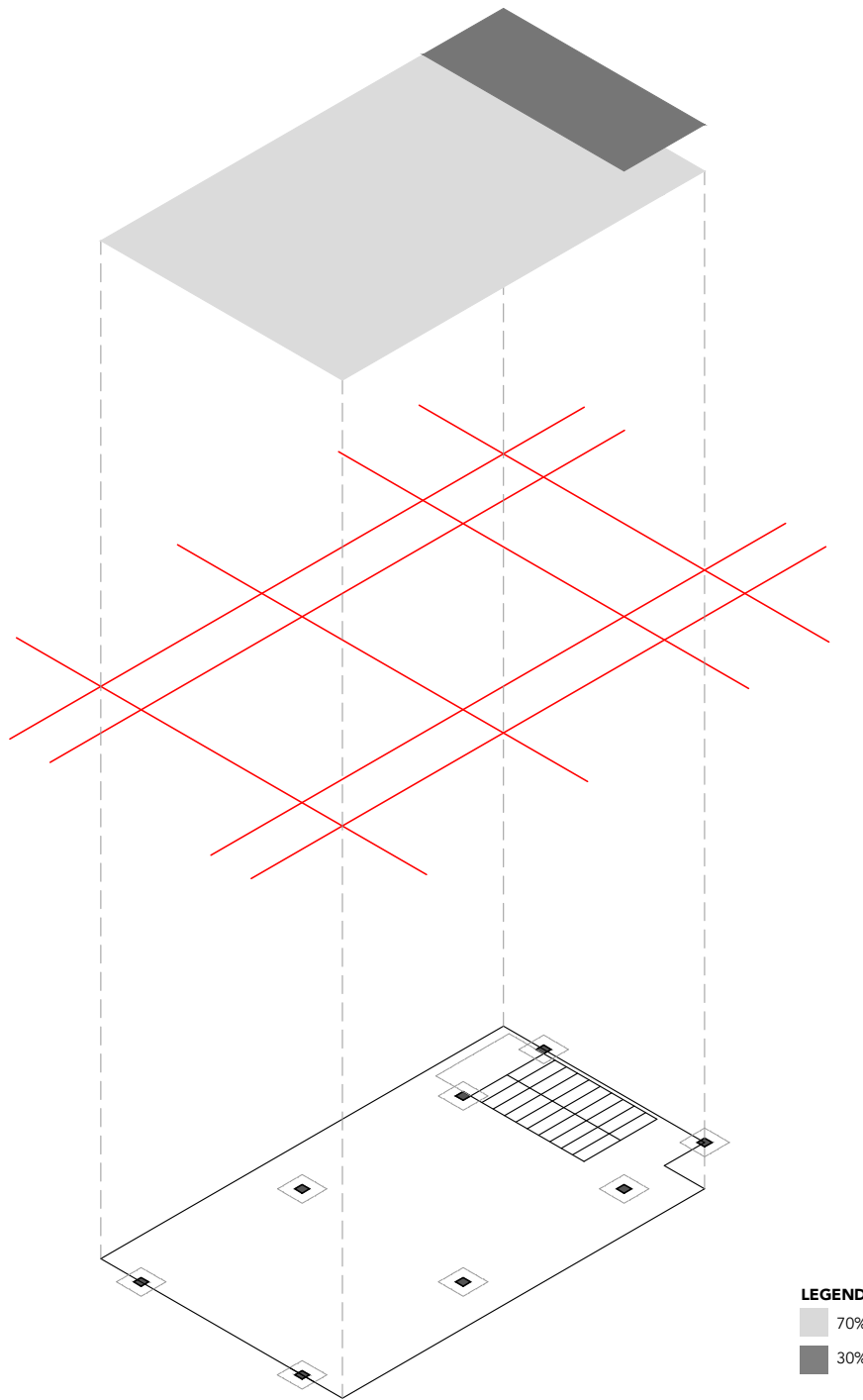


Figure 22: Plan-based analytical diagrams of Maison Dom-Ino showing in lighter gray the areas where users can appropriate the design

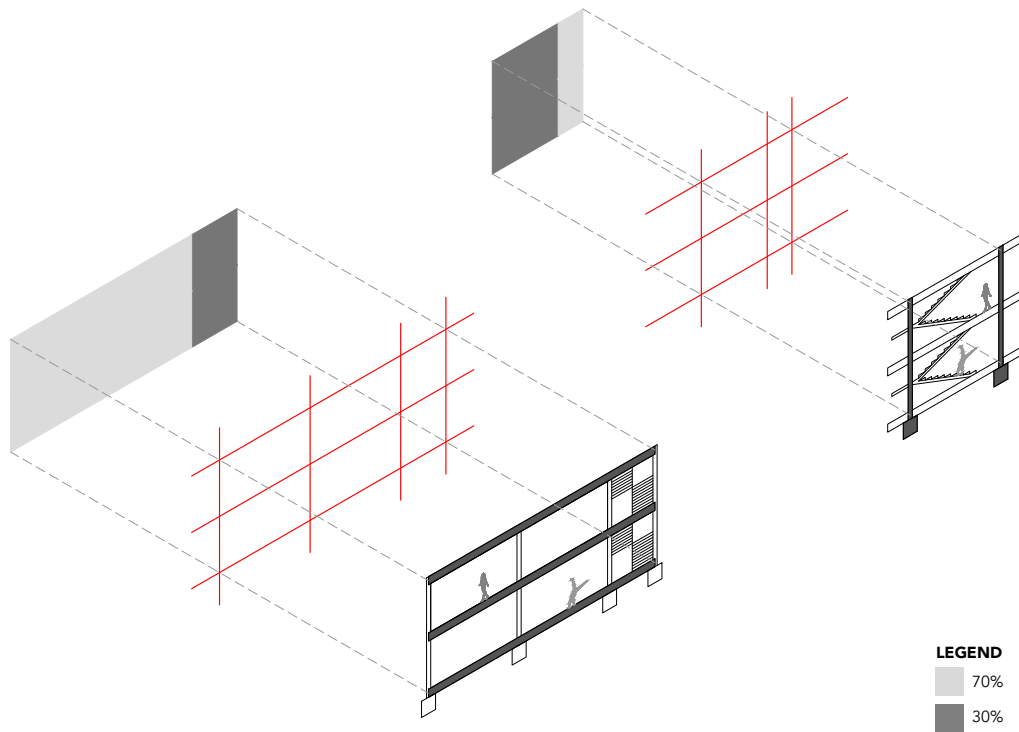


Figure 23: Section-based analytical diagrams of Maison Dom-Ino showing in lighter gray the areas where users can appropriate the design

The participation spectrum results (see Table 6 and Figure 24) for Maison Dom-Ino reflect both the theoretical and quantitative conditions to which the scheme was conceived. Since it was only developed at the speculative level, its scores also rely on Corbusier's vision for what Dom-Ino could become. Hence, due to the nature of the plan, imagined as an open building structured, allows for over 50% of its area for user's transformation on both interior and exterior, amounting to a score of **five (5)** on both units of analysis.

Regarding the project's belonging category, urban insertion received a score of **minus five (-5)**, considering the fact Corbusier already considered in his schemes how and where the units would be inserted in a hypothetical site. In contrast, unit

composition is ranked at **one (1)**, because the structural system of Dom-Ino was envisioned in a way that the residents could continue to combine their modules, following the structural clues provided by the frame of the design.

The categories of inclusion and autonomy and their respective variables of needs program, aesthetics, and design all scored **five (5)**, following the trend established by the typology category. The users would be able to establish their own needs program organizing the free plan offered by the scheme, and display their understanding of aesthetics and design through the customization of the exterior of their houses.

These values place Dom-Ino as **soft** scheme for social housing, demonstrated in Figure 25 below, with a participation spectrum mean of **three (3)**. This conclusion is evident when looking at the radar chart of the project, which shows more than half of the units of analysis scoring on the positive side of the soft & hard point scale.

MAISON DOM-INO (1914)		
PARTICIPATION SPECTRUM	SCORE	CATEGORIES
Interior	5	typology
Exterior	5	
Urban insertion	-5	belonging
Unit composition	1	
Needs program	5	inclusion
Aesthetics	5	
Design	5	autonomy
PARTICIPATION MEAN	3	

Table 6: Participation spectrum score for Maison Dom-Ino (2014), by Le Corbusier

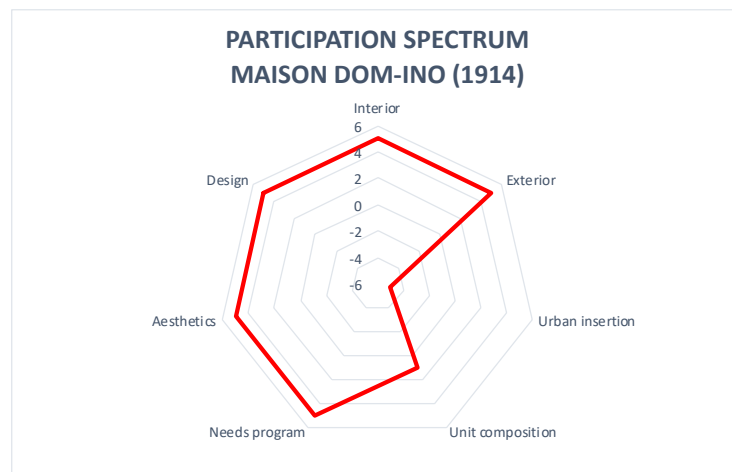


Figure 24: Radar chart showing the performance of Maison Dom-Ino (1914), by Le Corbusier, on each category generated from the soft & hard score

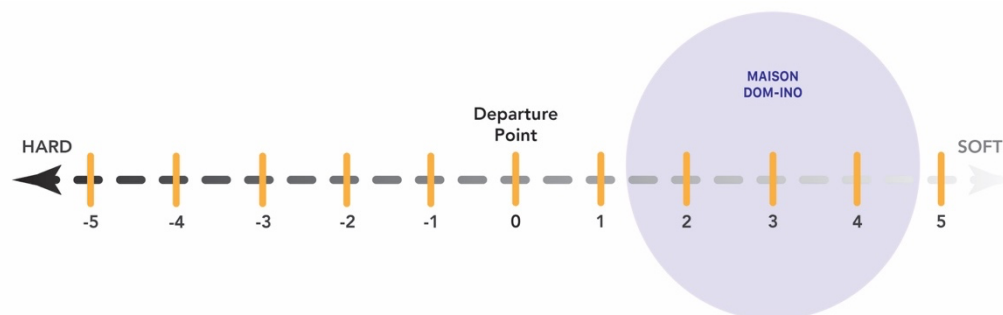


Figure 25: Soft & Hard mean for Maison Dom-Ino (1914), by Le Corbusier

Quartiers Modernes Frugès – PESSAC (1926)

Pessac's project represents a "mixture of unit types to put his various designs for the standardized dwelling into production." (Frampton, 1980, p.154). Hence, it follows a series of attempts to convey the ideas initiated with Maison Dom-Ino and the five points of Modern Architecture, defined in 1920 by Le Corbusier.

The aspect that makes Pessac such a fascinating project is that even though it was conceived at the highest possible level of standardization, it inherited the open building's attributes through functionalism and flexibility of the plan.

Historical context

After designing a small complex of houses for his client, M. Henry Frugès, at Lège³⁸, Corbusier's following challenge was to occupy the newly bought site at Pessac to produce a garden city. When tasking the architect with the design problem, the client said:

I authorize you to realize your theories in practice, even in their most extreme consequences; I want to achieve really conclusive results in the reform of cheap housing: **Pessac must be a laboratory**. I fully authorize you to break with all conventions, to abandon traditional methods. In a nutshell; **I ask you to pose the problem of the plan of the house, to find the standardization, to make use of walls, floors, roofs conforming to the most rigorous solidity and efficiency, lending themselves to a true Taylorization by the use machines that I authorize you to buy**. You will equip these houses with interior

³⁸ Le Corbusier designed ten houses for M. Frugès in a site located at the city of Lège-Cap-Ferret, a city in the southwest of France. Corbusier wrote an article in a journal named *L'Esprit Nouveau*, where he once more advocated for the need of tackling the house problem created by the war destruction. Once Frugès read the article, immediately associated the need for a housing solution regarding the site at Lège. (Boudon, 1969)

equipment and devices that make it easy and pleasant to live in. And **as for the aesthetic that may result from your innovations, it will no longer be that of traditional houses**, which are expensive to build and expensive to maintain, true eloquence. (Corbusier & Jeanneret, 1948, p.78)

The forward-thinking of Henry Frugès accelerated Corbusier's ideas for mass production when this concept was shy of a utopia in terms of domesticity. This reality generated strong reactions of residents during all the phases of Pessac. The architect shared an account of the people's sentiment towards his idea:

A generous man wants to show his country that the housing issue can be solved. Public opinion is stirred; **jealousies are aroused**; building corporations, from local small entrepreneurs to architects, are worried about **new methods that could upset existing situations**. So, little by little, an atmosphere of hostility is created. (Corbusier & Jeanneret, 1948, p.78)

While Corbusier could imagine some reaction regarding his approach to housing, in my understanding, he was not at all prepared to face the ramifications of the negative public opinion. In the discipline of architecture, when one defies the traditional, it is always a challenge. This condition is even more exacerbated when dealing with domesticity. As discussed in this dissertation, houses come to represent much more than a shelter, becoming extensions of a person's identity.

So, when one tries to advocate for a solution that completely subverts the sense of place and what constitutes individual identity, it is tough to comply.

Site context

Quartiers Modernes Frugès' site, indicated below in Figure 26, is located in the neighborhood of Pessac, inside the metropolitan region of Bordeaux, in France. Henry Frugès purchased the “dry site” (Corbusier & Jeanneret, 1948), and requested that Corbusier designed not simply a housing complex, but a laboratory.



Figure 26: Aerial view from the site of Pessac, in Bordeaux. Google Maps, 2020. Accessed on August of 2020

Architectural theory

At Pessac, Corbusier had the opportunity to apply mainly three theories in his designs:

1. Mass production;
2. The five-points of Modern Architecture;
3. Polychrome.

Although these terms and theories frequently populate the discussions on Corbusier's work, as (Boudon, 1979, p.29-30) remarked, some of them were not entirely his own, but rather the product of an international movement.

In Corbusier's words, his architectural framework for the project was clear:

Pessac is designed because of reinforced cement
The goal: the cheap.
The means: reinforced cement.
The method: standardization, industrialization,
Taylorization.
Structure: A single reinforced cement beam (Prima floor)
of five meters for the entire subdivision, etc., etc.
**This is an example of modern urbanization, where
historical memories, the Swiss chalet or the Alsatian
dovecote have been left in the museum of the past. A
mind devoid of romantic shackles seeks to solve a well-
posed problem.** (Corbusier & Jeanneret, 1948, p.79)

Project analysis

Following the principles of functionalism and "house as a machine", Le Corbusier's plans for Pessac "appear freer and simpler: four squares, two measuring 5m x 5m and two 2.5m x 2.5m" (Boudon, 1979, p.30). The typologies derived from the combination of two main cells, as depicted in Figure 27.

Using the modular cell, Corbusier produced four different typologies for Pessac, all generated using a five-meter grid and standardized pre-fabricated elements (see Figures 28 and 29):

1. Staggered (*Quinconce*)
2. Z-formation
3. Arcade (*Arcade*)

4. Skyscraper (*Gratte-Ciel*)

5. Free-standing (*Isolée*)

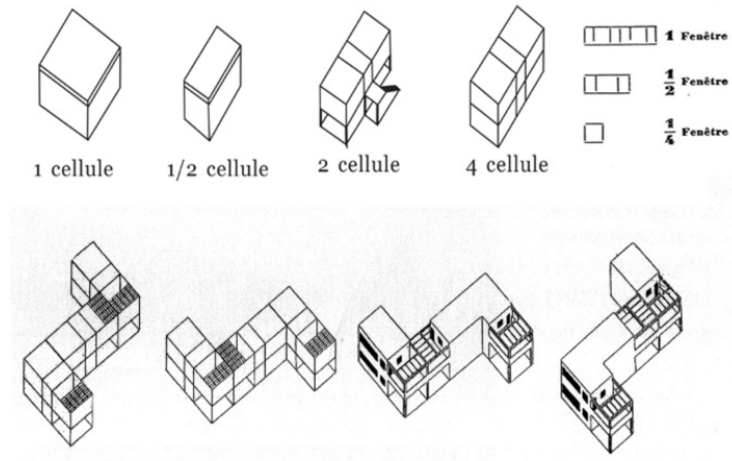


Figure 27: Modular generator cell for Pessac's typologies. Reprinted from Boudon (1979)

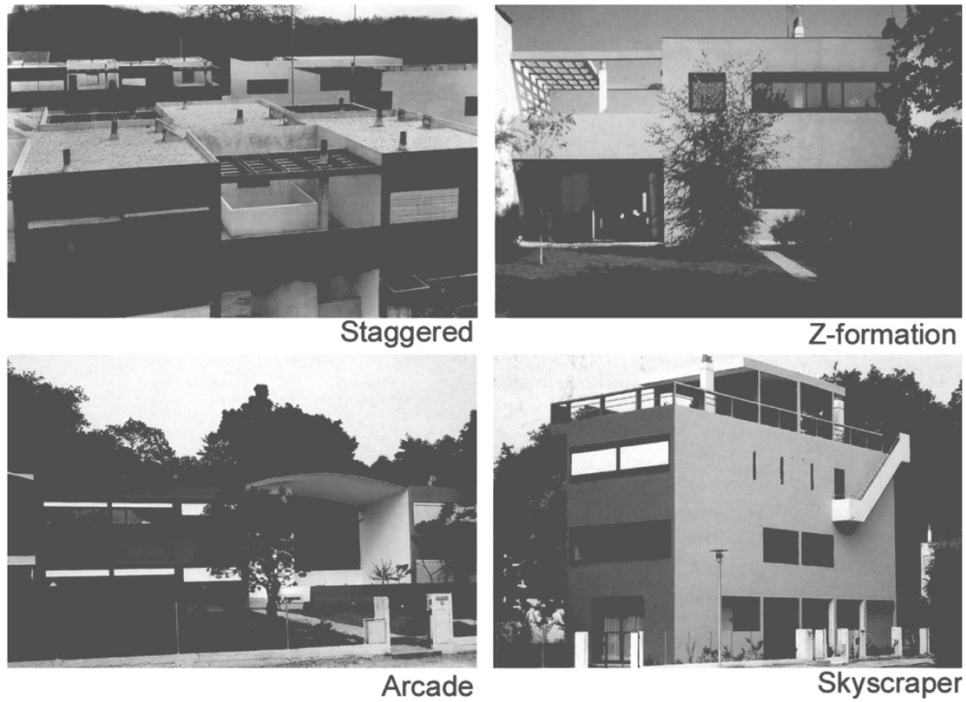
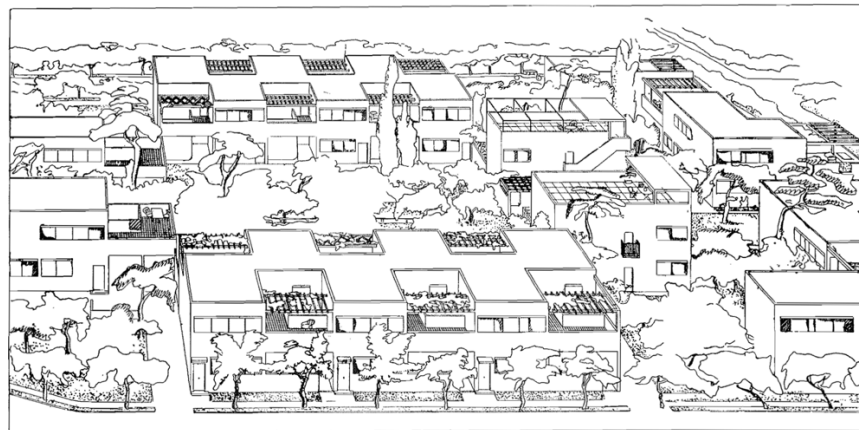


Figure 28: The built typologies of Pessac (1926), by Le Corbusier. Reprinted from Hsu & Shih (2006)



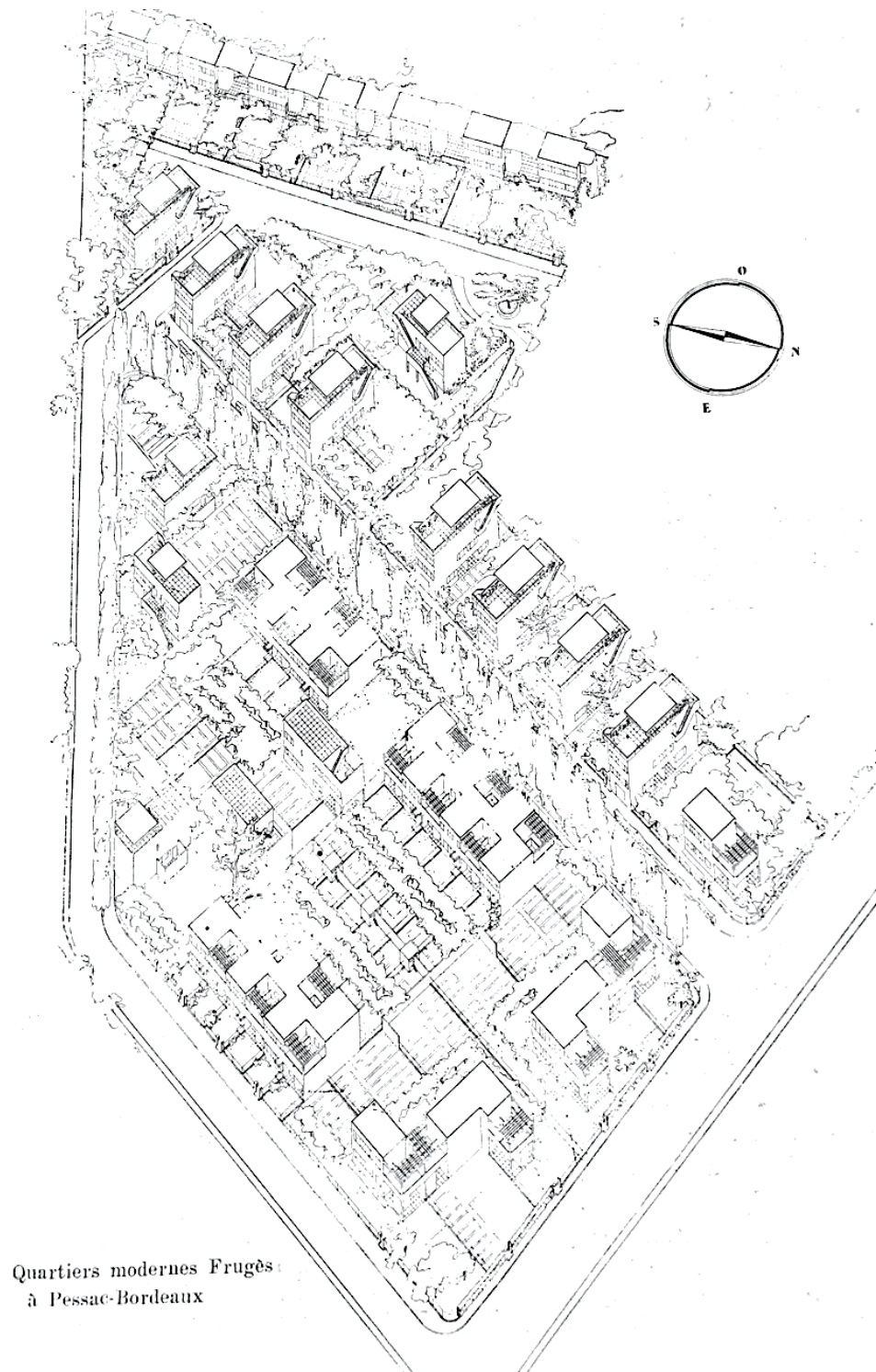
BORDEAUX-PESSAC, 1924. MODERN DWELLINGS
Showing part of a large housing-scheme. The primary elements have been minutely fixed and are multiplied with endless variations. This is a genuine industrialization of the Builders' Yard.

Figure 29: Perspective drawing of Pessac (1926), by Le Corbusier, showing the housing typologies. Reprinted from Corbusier & Jeanneret (1948)

In reflecting on Pessac's design decisions for the insertion and composition of the dwellings (see Figure 30), Siegfried Giedion (1995) argued that the Dom-Ino scheme is so strong and transcendent that all of Corbusier's designs go back to it. In interpreting the typologies' material slenderness as a free-flowing structure, he confers the system a degree of poetics.

I find that this assumption is valid. Although conceived within standardization, the interior of houses is the purist representation of the free plan, allowing higher customization levels. Hence, we can interpret that Corbusier involuntarily designed an open system³⁹ subjected to appropriation. The flexible character of the design allowed the once dissatisfied tenants to find their identity and sense of place within Corbu's idea, as seen in Figure 31 with the color repurposing of the houses.

³⁹ This assumption is demonstrated in the Participation Spectrum Analysis section of this project.



Quartiers modernes Frugès
à Pessac-Bordeaux

Figure 30: Site Plan perspective drawing of Pessac (1926), by Le Corbusier. Reprinted from Corbusier & Jeanneret (1948)



Figure 31: Renovated typologies of Pessac (1926), by Le Corbusier. Imaged from 2017, photo credit Nikolas Ernult and courtesy of UNESCO at www.metalocus.es

Philippe Boudon (1979) was also able to observe the potentials of Pessac as an open system. He interviewed residents that customized their houses and examined their updated designs. The author produced a conceptual map, reproduced in Figure 32, where he reinterpreted Corbusier site planning from the perspective of the users' modifications. When analyzing Corbusier's original plan, the author argued that it could provide a wide range of combinations, if desirable.

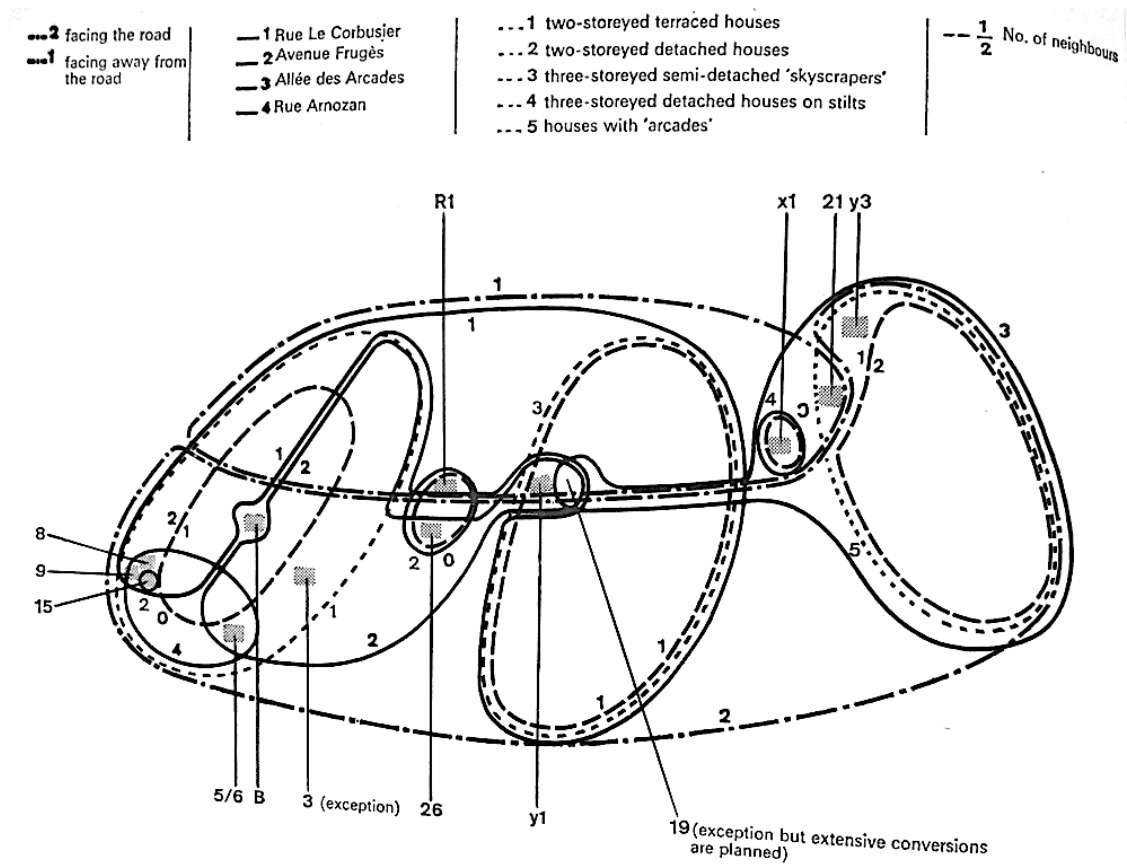


Figure 32: Boudon's conceptual site map of Pessac (1926), by Le Corbusier, indicating houses modified by its residents. Reprinted from Boudon (1979)

Participation spectrum assessment

Pessac's performance assessment was based on the floor plans and facades of five different typologies designed by Corbusier for the project. To establish a spatial understanding of how participation elements can function in the project, I generated analytical diagrams from the drawings.

This analytical representation allowed me to calculate the project's ratio of the area permitted for the users to appropriate and apply this percentage according to the soft & hard point score.

The diagrams depicted below on Figures 33, 34, 35, 36, and 37 display three levels of information for Pessac:

1. The projects' floor plan (the generator), displayed in black and white;
2. The modular organization (the frame), shown in red;
3. The distribution of areas where users can appropriate the design is presented in two gray shades. The lighter shows area subject to appropriation, whereas the darker displays fixed spaces, immutable in the design.

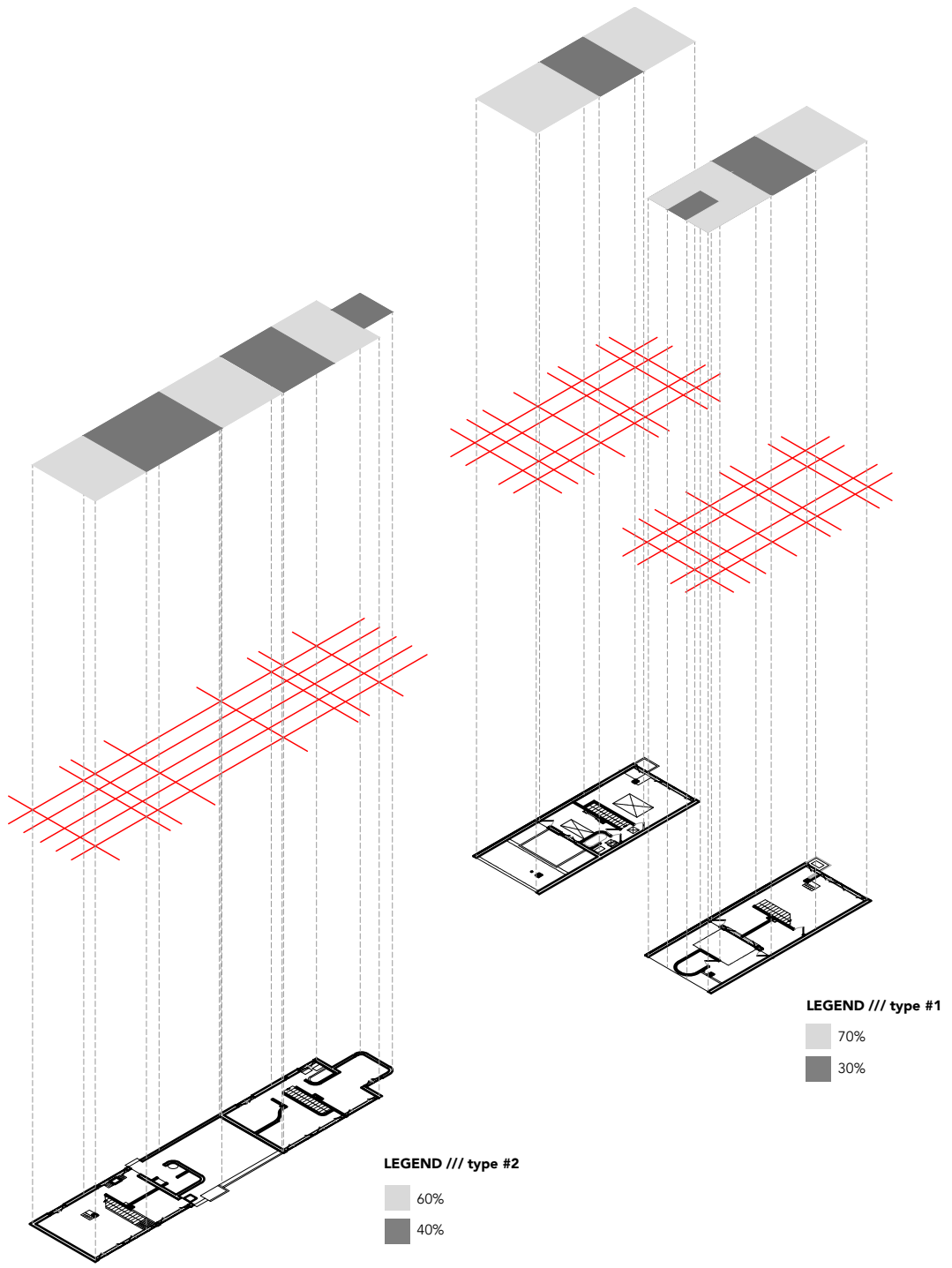


Figure 33: Plan-based analytical diagrams of Pessac's typologies #1 and #2 showing in lighter gray the areas where users can appropriate the design

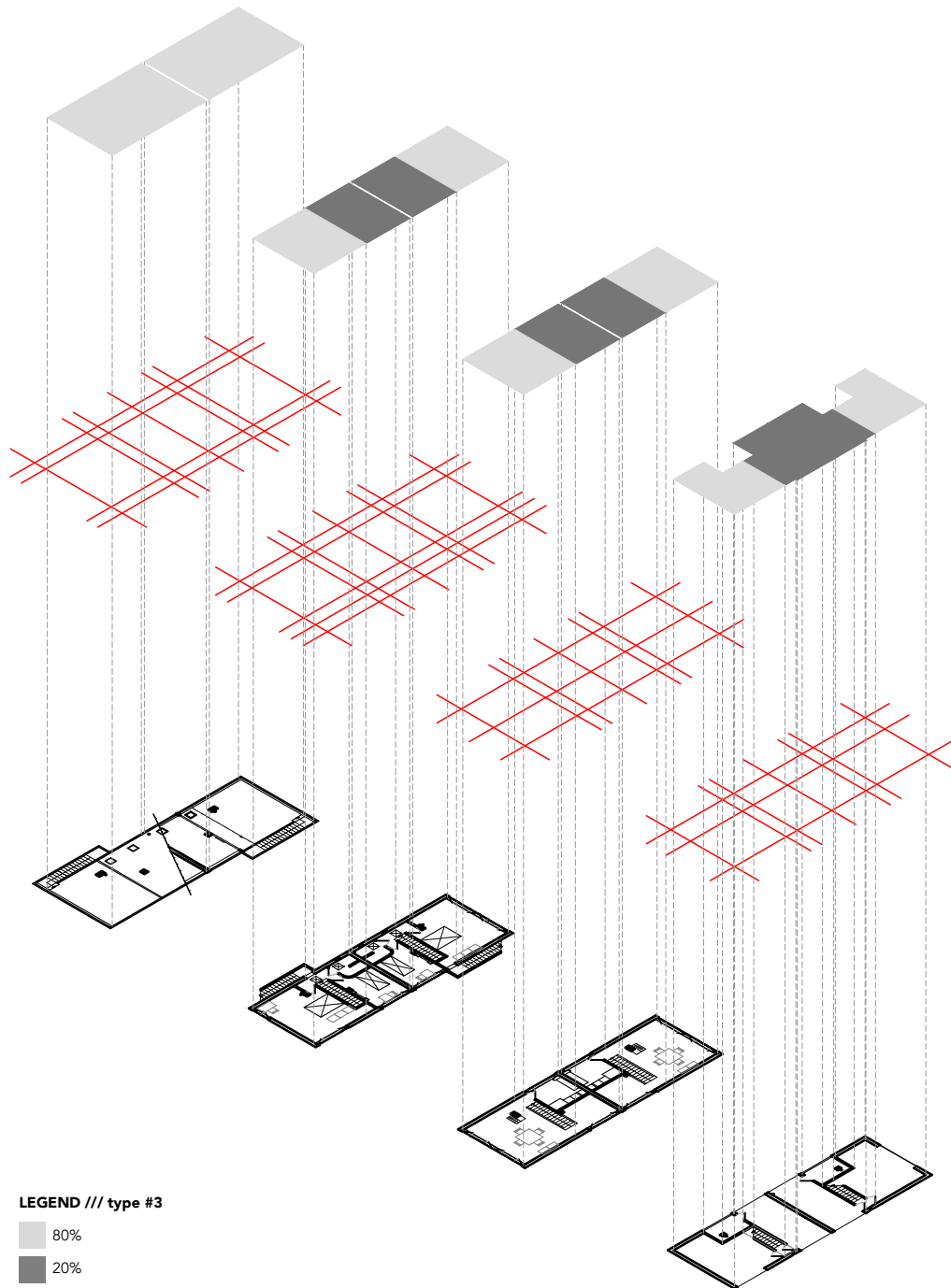


Figure 34: Plan-based analytical diagrams of Pessac's typology #3 showing in lighter gray the areas where users can appropriate the design

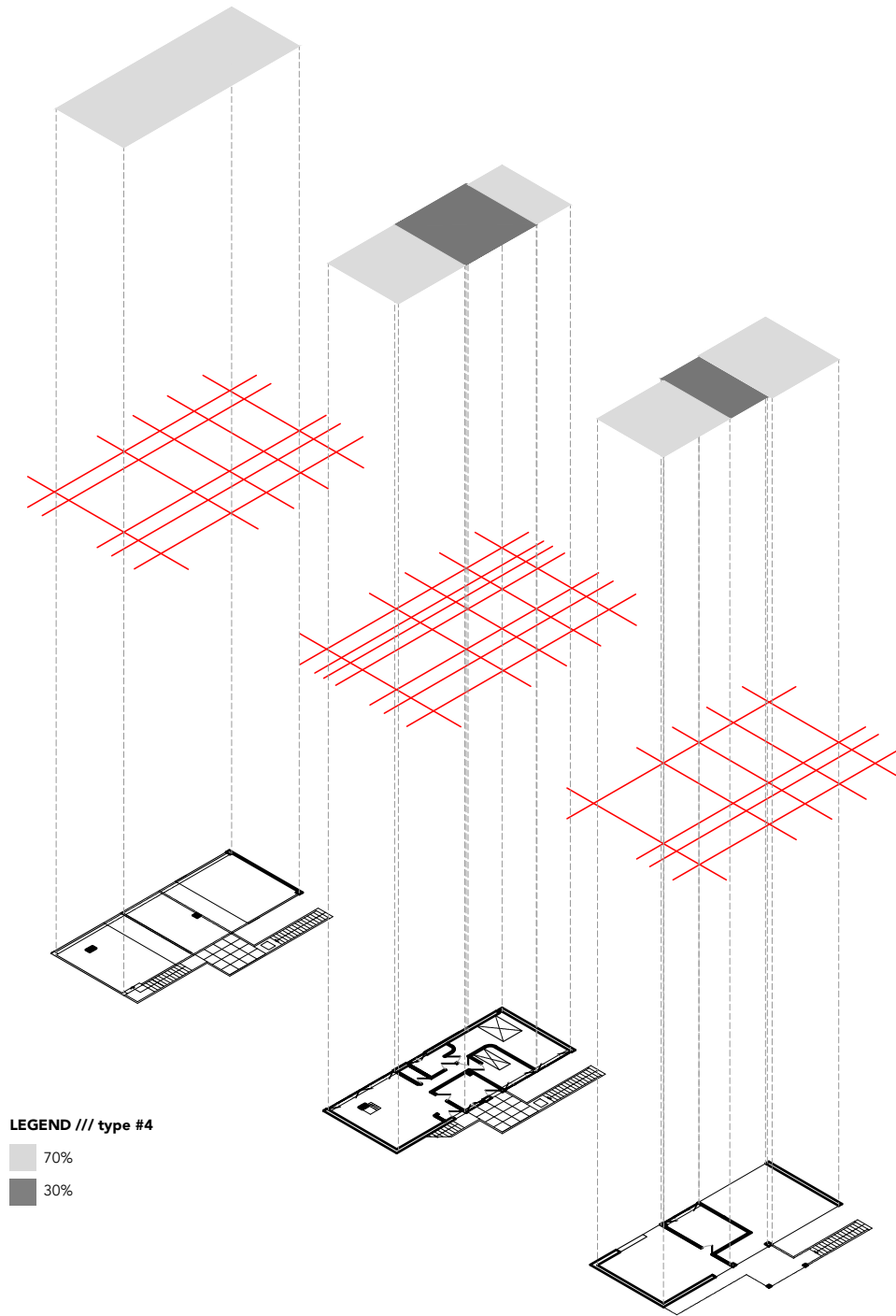


Figure 35: Plan-based analytical diagrams of Pessac's typology #4 showing in lighter gray the areas where users can appropriate the design

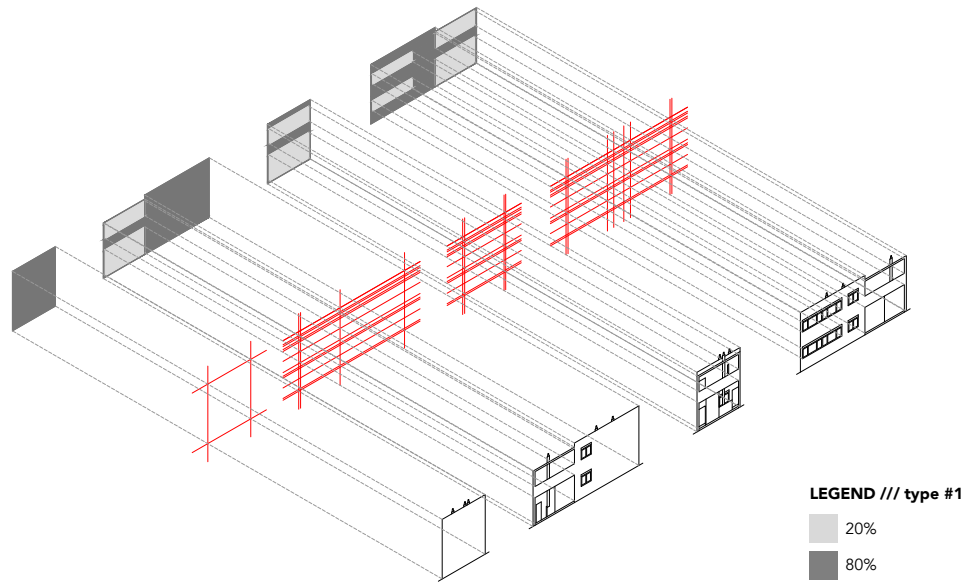


Figure 36: Facade-based analytical diagrams of Pessac's typology #1 showing in lighter gray the areas where users can appropriate the design

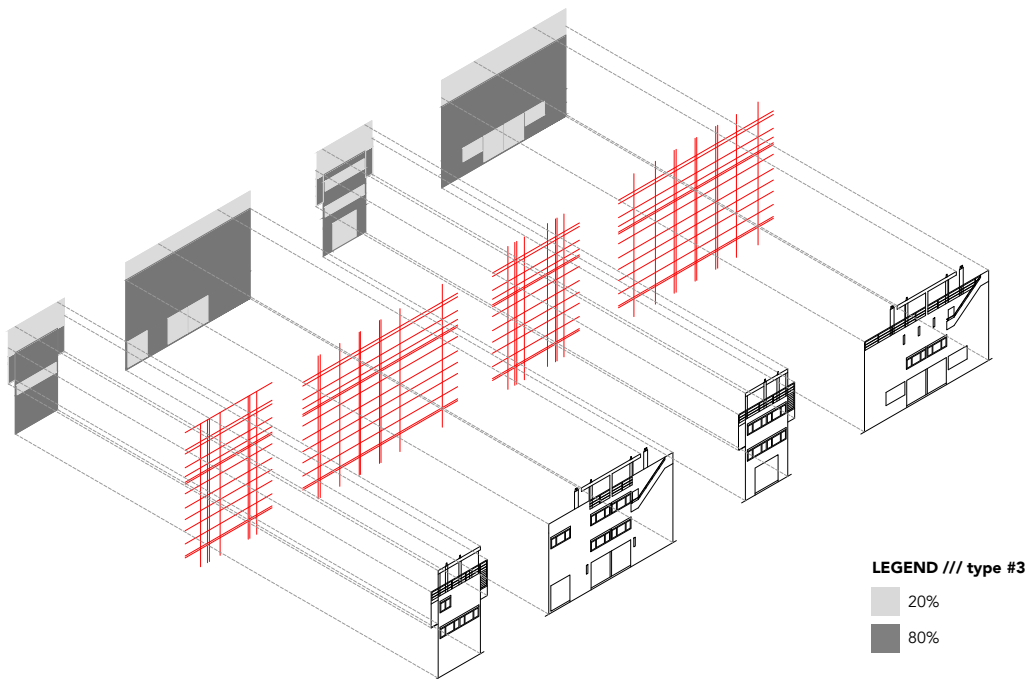


Figure 37: Facade-based analytical diagrams of Pessac's typology #3 showing in lighter gray the areas where users can appropriate the design

The participation spectrum results for Pessac (demonstrated on Table 7 and Figure 40), reflect both the theoretical applications of the five points of Modern Architecture by Corbusier, and post-occupation interviews and data collected by Boudon (1979).

At the typology category, the interior unit of analysis scored **five (5)**, justified by the incorporation of a free plan that allowed from sixty (60%) to eighty (80%) percent of customizable area for the residents depending on the typology. The exterior, designed following the concept of regulating lines, allowed for twenty percent (20%) of customization of the facades, ranking **minus two (-2)** on the soft & hard point scale.

Regarding the project's belonging classification, urban insertion and unit composition received a score of **minus five (-5)**, considering the fact Le Corbusier decided every aspect of the projects' location and disposition, while Mr. Henry Frugès provided the complex's site, leaving the prospective users with no input.

The needs program unit ranked **one (1)** because of the amount of interior space allowed for modification, despite the fact that the residents never communicated their aims and needs to Corbusier. This soft score derives once again from the application of the free plan, a principle that embodies a flexibility that consequently leads to appropriation.

Lastly, the category of autonomy scored **minus three (-3)** on both units of aesthetics and design, due to the possibility of changing the exterior aspect of the typologies, especially concerning the windows' size and format. In the case of Pessac, this modification would alter the overall façade proportion defined by Corbusier through

the regulating lines. Even with such a hard score, several tenants customized their houses, some to the point of redefining the design aesthetics, as seen in Figures 38 and 39.



Figure 38: Exterior design alterations at Pessac (1926), by Le Corbusier. Reprinted from Boudon (1979)

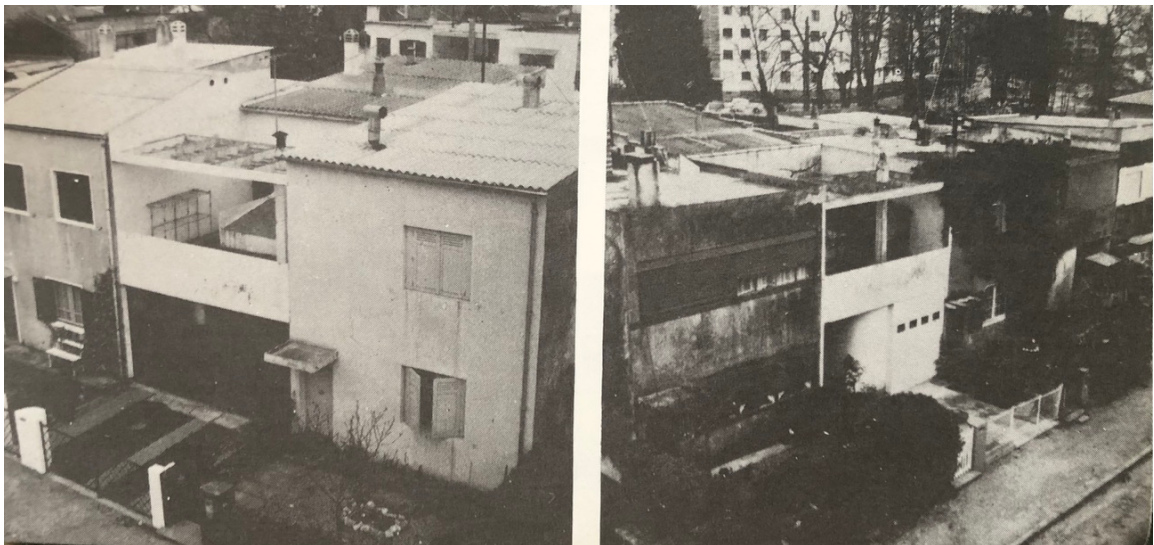


Figure 39: Exterior design alterations at Pessac (1926), by Le Corbusier. Reprinted from Boudon (1979)

These values place Pessac as **hard** scheme for social housing (see Figure 41), with a participation spectrum mean of **minus one point seventy-one (-1.71)**. This conclusion is evident when looking at the radar chart of the project, which shows five of

the seven units of analysis scoring on the negative side of the soft & hard point scale.

Nevertheless, the project still allows significant appropriation at the individual level.

PESSAC (1926)		
PARTICIPATION SPECTRUM	SCORE	CATEGORIES
Interior	5	typology
Exterior	-2	
Urban insertion	-5	belonging
Unit composition	-5	
Needs program	1	inclusion
Aesthetics	-3	autonomy
Design	-3	
PARTICIPATION MEAN	-1.714286	

Table 7: Participation spectrum score for Pessac (1926), by Le Corbusier

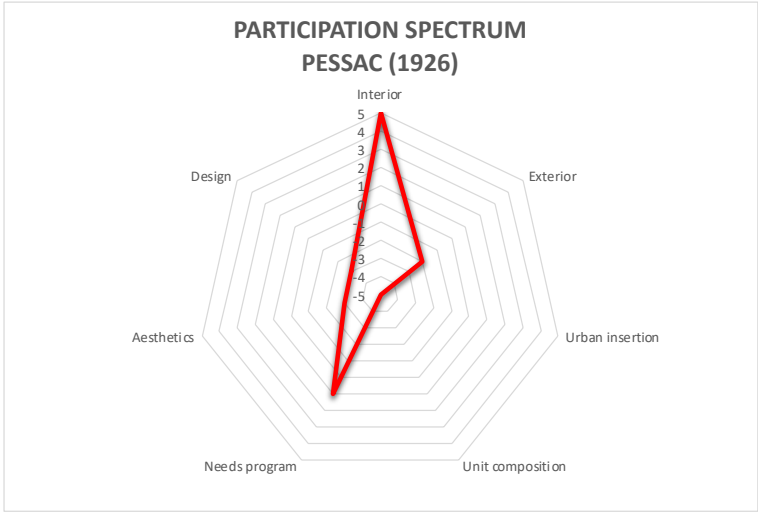


Figure 40: Radar chart showing the performance of Pessac (1926), by Le Corbusier, generated from the Participation Spectrum score

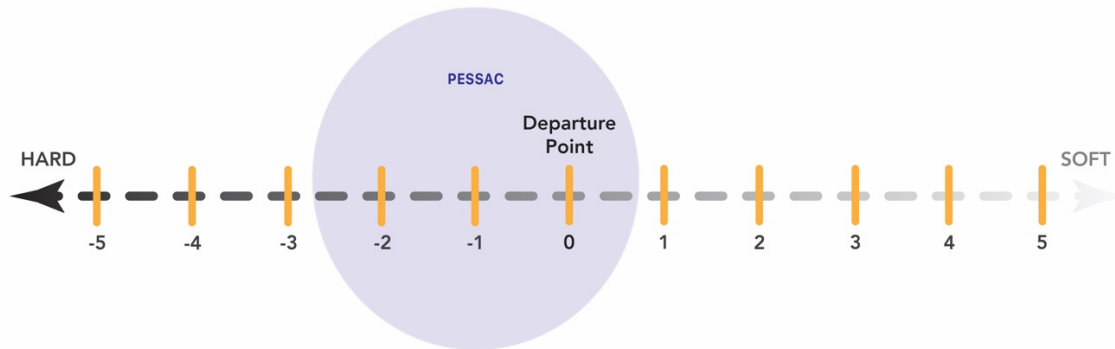


Figure 41: Soft & Hard mean for Pessac (1926), by Le Corbusier

Villaggio Matteotti (1974)

Considered the first and only neighborhood built in Italy using a participatory design process, the project of Villaggio Matteotti gave Giancarlo de Carlo the opportunity to apply his theories regarding user participation. This case study materializes the discourse of user involvement initiated by de Carlo since the TEAM X meetings.

Historical context

The historical context concerning 1969, year of the project's commission to Giancarlo de Carlo, embodies a continuous trend of change in social housing discourse. The new paradigms brought by the meetings of TEAM X in 1956 and 1959, in addition to the Supports theory of Habraken (1961)⁴⁰, and Walter Segal's self-assembly method (1962), represented an epoch of politicization of architecture. That context aligned

⁴⁰ The year of 1961 marked the dutch publication of the Supports Theory: *De Draggers en de Mensen, het einde van de massawoningbouw*.

perfectly with de Carlo's ideologies, published in his *Architecture's Public manifesto*, which advocated not only for better solutions for housing, as well as for the democratization of the architectural design process through participation.

So, when the management of the state-owned steelworks presented him with the possibility of the housing complex in Terni, de Carlo only accepted the commission after studying thoroughly the situation of the project. He made sure that the prospective residents would be a part of the process, honoring his ideology of viewing "architecture as a social process, as the possibility of transformation, of political action. Architecture as a social project." (Barone, 2002, p.149)

Site context

The site of Villaggio Matteotti (displayed in Figure 42) is placed in city of Terni, located about 100 km northeast of Rome. Comprised of 20 hectares, the site and its houses had been experiencing degradation since 1930s, as cited below:

The residential complex is situated on the same site occupied by the "Italo Balbo" village, built for the city's steel workers between 1934 and 1938 according to the canons of the Fascist regime: a collection of unhealthy and monotonous homes still inspired by rural characteristics and devoid of any facilities or services. (Docomomo, 2003, p.4)

Zucchi (1992) notes that by 1960s, the neighborhood was beyond repair, leaving the 800 employees and their families - almost 3,000 people - in a difficult position concerning living conditions. The existent houses and collective amenities equipment at

the site were deteriorated, and the neighborhood represented an outdated image of the city. With Terni's development, Villaggio Matteotti had "become encircled, moreover, by the expanding city and had been earmarked for redevelopment at higher densities in a recent town plan." (Zucchi, 1992, p.106). Domenico di Masi corroborated this vision when he wrote:

The steel mill has never devoted many resources to social programs let alone the construction of residences for his workers. Its residential assets consist of in fact, some decrepit buildings in the urban center, a nucleus of new houses on the outskirts, and finally the Matteotti village. The Matteotti village when it was - in two successive phases, in the period between the two wars - it was an isolated worker ghetto in the countryside, built at low density with two story houses and four apartments of poor construction quality (precarious foundations, humidity on the ground floors, poor windows , permeable perimeter walls, almost non-existent services, etc.), devoid of collective equipment, fed by clay paths, cheered only by the sweetening of those stylistic elements - between the rural Umbrian village and the English garden city." (Bracco, et al., 1977, p.18)

After proposing to sell the old houses to the steelworkers to avoid the cost of renovation, the management of the neighborhood faced a political problem: the residents demanded new houses with a higher architectural quality (Zucchi, 1992; Barone,2002). At this moment, the managers decided to invite Giancarlo de Carlo to propose the new configuration of Villaggio Matteotti.



Figure 42: Aerial view from the site of Villaggio Matteotti, in Terni. Google Maps, 2020. Accessed on August of 2020

Architectural theory

In *Architecture's Public* (1980), de Carlo wrote:

(...) we have the right to ask why housing should be as cheap as possible and not, for example, rather expensive; 'why' instead of making every effort to reduce it to minimal levels of surface, of thickness, of materials, we should not try to make it spacious, protected, isolated, comfortable, well-equipped, rich in opportunities for privacy, communication, exchange, and personal creativity? (de Carlo, 1980, p.13)

By respecting this premise, the architect embodied a theoretical framework composed of two main strategies: participatory design and sociology. By inviting sociologist Domenico di Masi to contribute to the project, de Carlo signaled a genuine interest in connecting with the residents at a deeper level. Sergio Bracco described the

team as an interdisciplinary group, “the most updated I formula in those years (1970) for a commitment to the thorny problem of house design.” (Bracco, et al., 1977, p.14)

The commitment to the participatory design methodology was extremely genuine for the architect. This stance transpired through the six years that the project was under development, incurring twelve (12) phases of participatory design processes (Bracco, et al., 1977).

Project analysis

After accepting the project’s commission and studying the area, Giancarlo de Carlo gathered the residents and presented a series of innovative contemporary housing schemes (see Figure 43) from around the world to demonstrate the residents understanding of architectural culture (Zucchi, 1992). To de Carlo’s surprise, the residents chose the most innovative option, indicating to him their architectural understanding. That indication pointed the architect towards an aesthetic based from a tridimensional grid in exposed concrete.



Figure 43: Participatory design sessions with the residents for Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Zucchi (1992)

Furthermore, the exchanges with the residents also served for the architect to identify their search for a collective identity. By discussing the project at the general level, they were able to adjust the communal spaces, and focus on establishing a hierarchy of circulation in the complex. Is interesting to note here the use of an open system in the project at the urban level (as shown in Figures 44 and 45), highlighted by Bracco, et al. (1977):

de Carlo's method for Terni, in collaboration with the sociologist De Masi, **sought a balanced and scientifically supported position between the two extremes of architects who impose their designs on the one hand, and the self-determination of users on the other. (...)** **The three-dimensional grid defined by De Carlo served as a reference, an open system within which to insert the inhabitants' requests (garden terraces, the independence of the units, the variety of internal layouts), whose old habits were modified through this process.** This occurred without constricting the architect's creative abilities that, on the other hand, were in reality reinforced. (p.14)

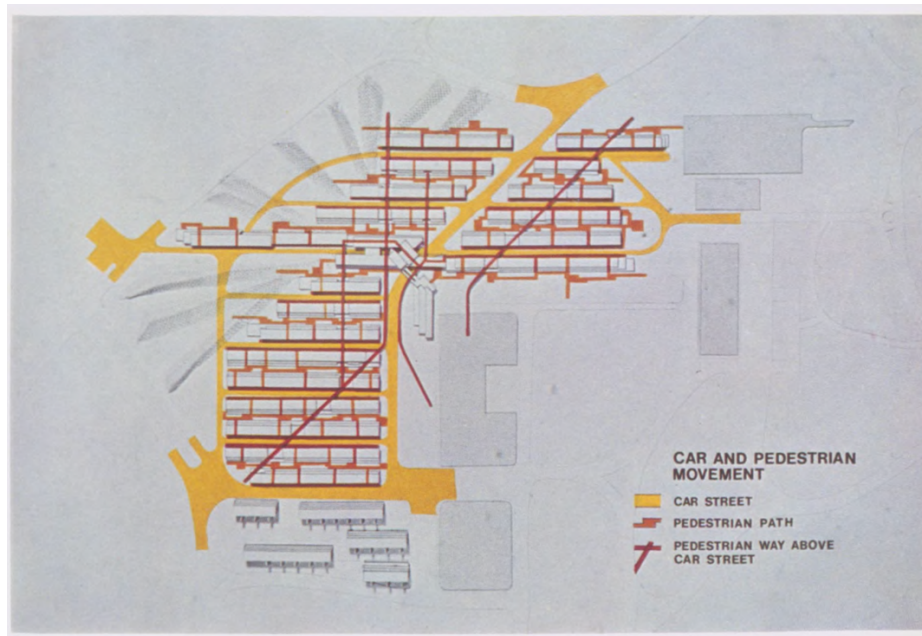


Figure 44: Masterplan of Villaggio Matteotti (1974), by Giancarlo de Carlo, showing circulation. Reprinted from Bracco, et al. (1977)

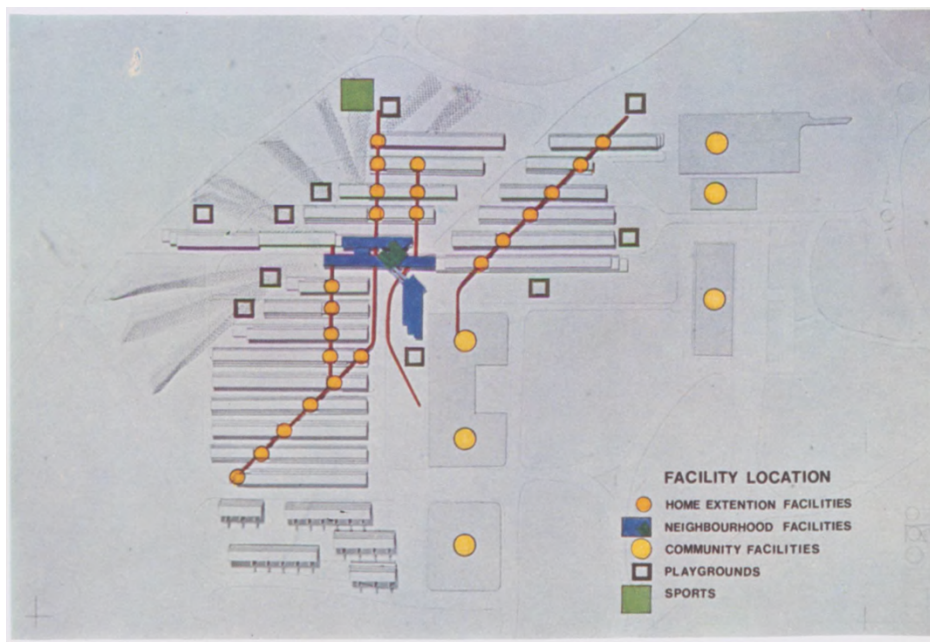


Figure 45: Masterplan of Villaggio Matteotti (1974), by Giancarlo de Carlo, showing collective spaces. Reprinted from Bracco, et al. (1977)

After developing the overall layout of the neighborhood, the architect advanced to the typology development. He presented forms that were refined with the residents' input, until arriving at a tridimensional response agreed by all (see Figure 47). Since the neighborhood urban design strategy separated vehicular and pedestrian routes as a project premise, the refined dwellings "were arranged in terraces separated alternatively by communal gardens and roads feeding the car parking spaces located at ground level below the buildings." (Zucchi, 1992, p.107)

Giancarlo de Carlo designed five building types, each containing three dwellings, totaling fifteen (15) different apartment types. Under these types, there were forty-five (45) possible layout combinations personalized by the participatory design sessions with the residents, show in Figure 46 below.

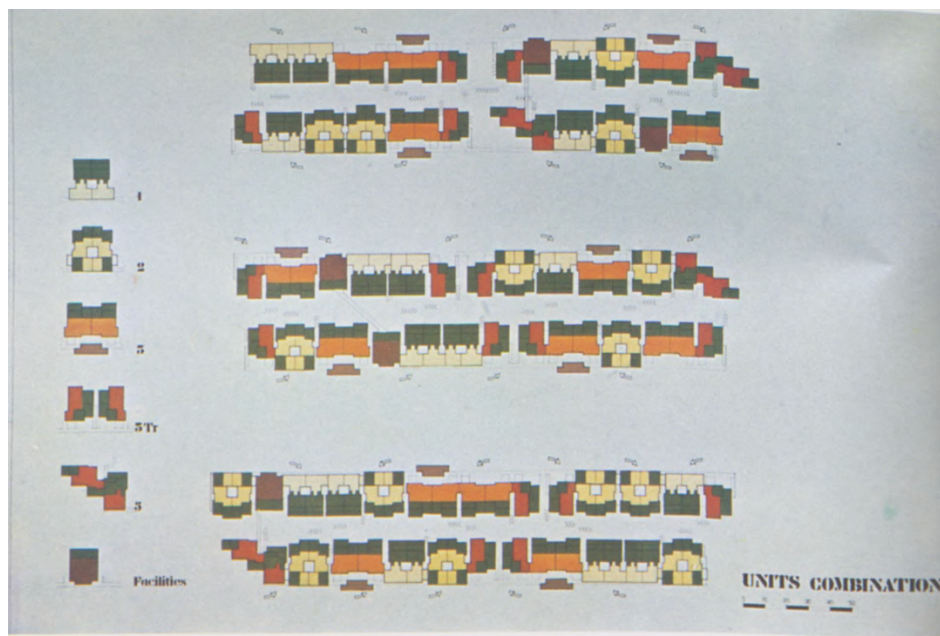


Figure 46: Unit combination at the site of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Bracco, et al. (1977)

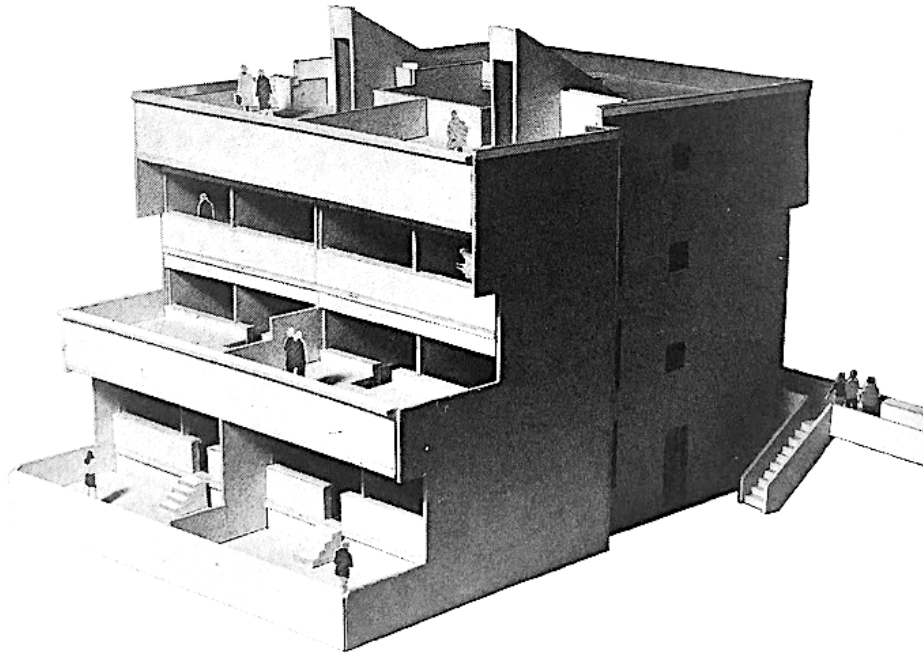
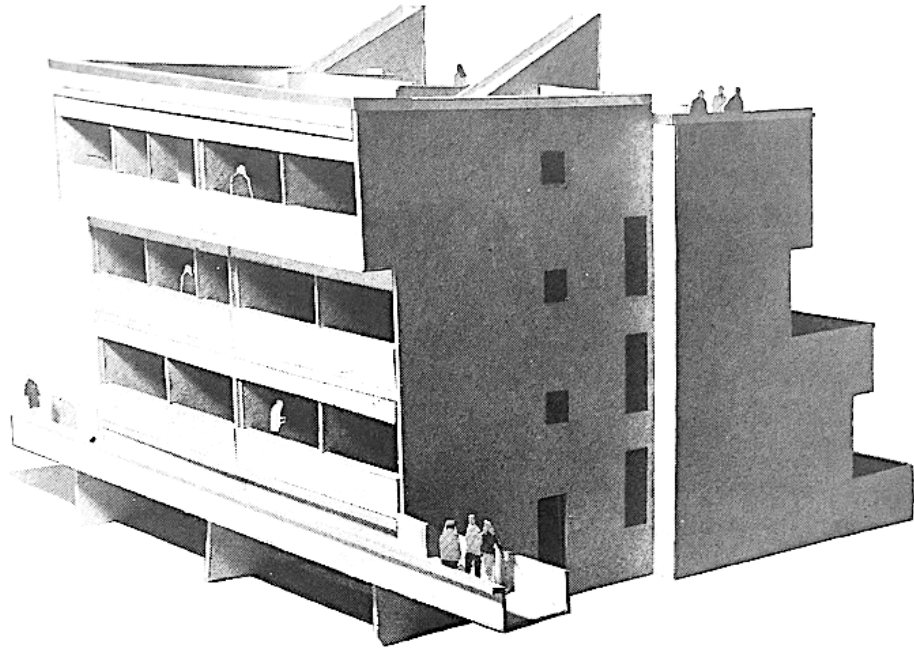


Figure 47: Volumetric configuration of Typology 1 of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Zucchi (1992)

Although the participatory design process helped de Carlo define the form's parti and typology detail, the final aesthetic form of the neighborhood is somehow a contradiction to the architect's harsh criticism of Modern Architecture. Even though applying a "part-to-whole" strategy in dealing with the urban scale to safeguard instances of small scale within the houses, the final aesthetic result for Villaggio Matteotti shares both the tectonics and proportions of Modernism (see Figures 48, 49, and 50). Nevertheless, the architect firmly stated that the aesthetics were a result of the project's structure and shifting throughout the site.

Benedict Zucchi (1992), also noticed the power of the structure – frame – in defining the character of the project:

(...) **structure precedes form.** The forms (individual building types) coalesce around the structure (the three-dimensional grid of pedestrian and vehicular routes) but they are conceptually and geometrically distinct from it. Here, **structure and form might almost be thought of as twin phenomena, the architectural counterpart of other twin phenomena like continuity and change, nature and history, or place and people.** The creation of architectural forms is a part of history (social, cultural, architectural) and part of the act of taking physical and psychological possession of a site – making space into place. (Zucchi, 1992, p. 114-115)



Figure 48: Villaggio Matteotti (1974), by Giancarlo de Carlo, right after project delivery. Reprinted from Docomomo (2003)



Figure 49: Overall aesthetics of Villaggio Matteotti (1974), by Giancarlo de Carlo. Reprinted from Docomomo (2003)

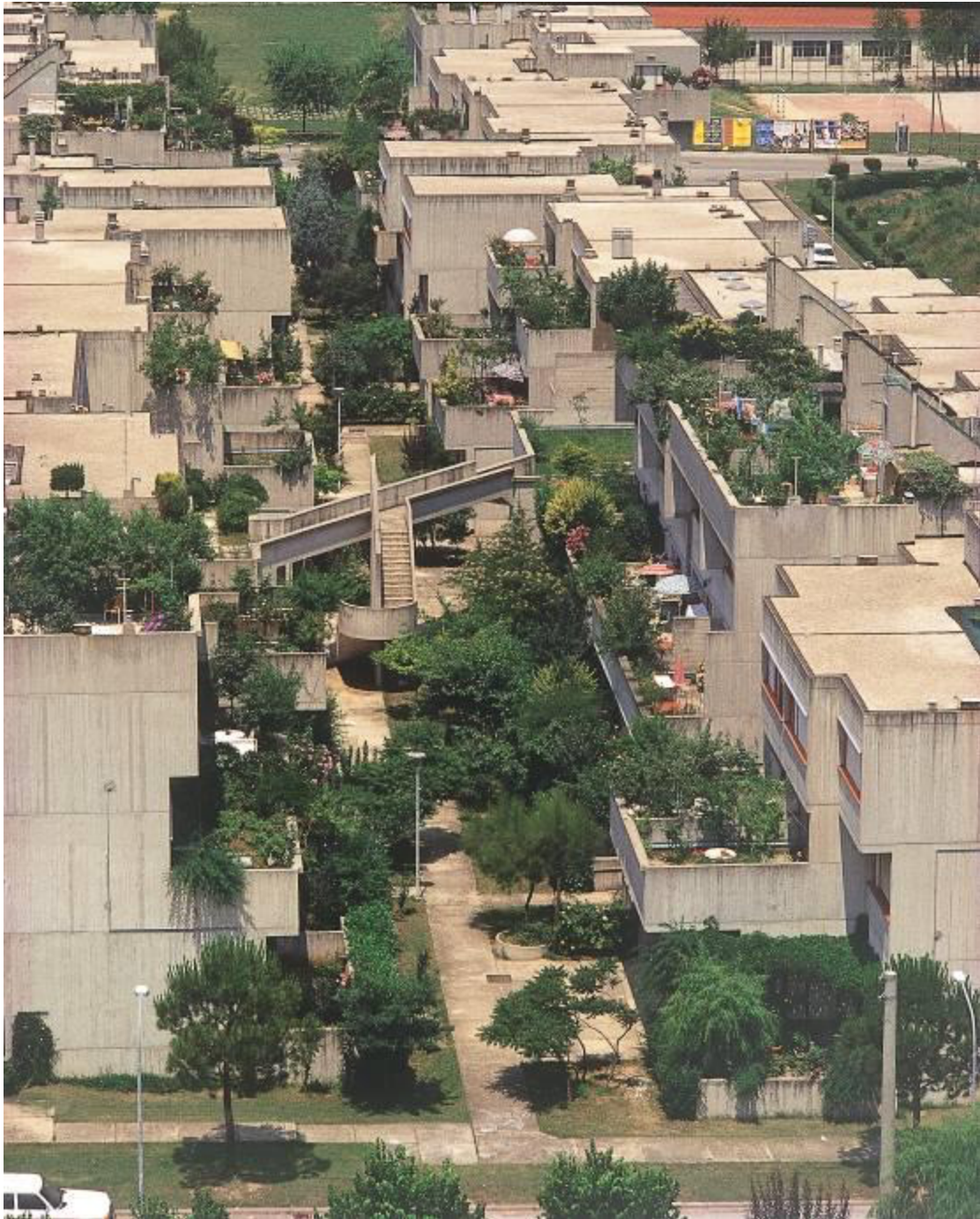


Figure 50: Complex view of Villaggio Matteotti (1974), by Giancarlo de Carlo, highlighting the bridges and gardens of the project. Reprinted from Docomomo (2003)

Participation spectrum assessment

Villaggio Matteotti's performance assessment was based on the floor plans and section of the typology designed by Giancarlo de Carlo for the project. To establish a spatial understanding of how participation elements can function in the project, I generated analytical diagrams from the drawings.

This analytical representation allowed me to calculate the project's ratio of the area permitted for the users to appropriate and apply this percentage according to the soft & hard point score.

The diagrams below (see Figures 51 and 52), display three levels of information for Villaggio Matteotti:

1. The projects' floor plan (the generator), displayed in black and white;
2. The modular organization (the frame), shown in red;
3. The distribution of areas where users can appropriate the design is presented in two gray shades. The lighter shows area subject to appropriation, whereas the darker displays fixed spaces, immutable in the design.

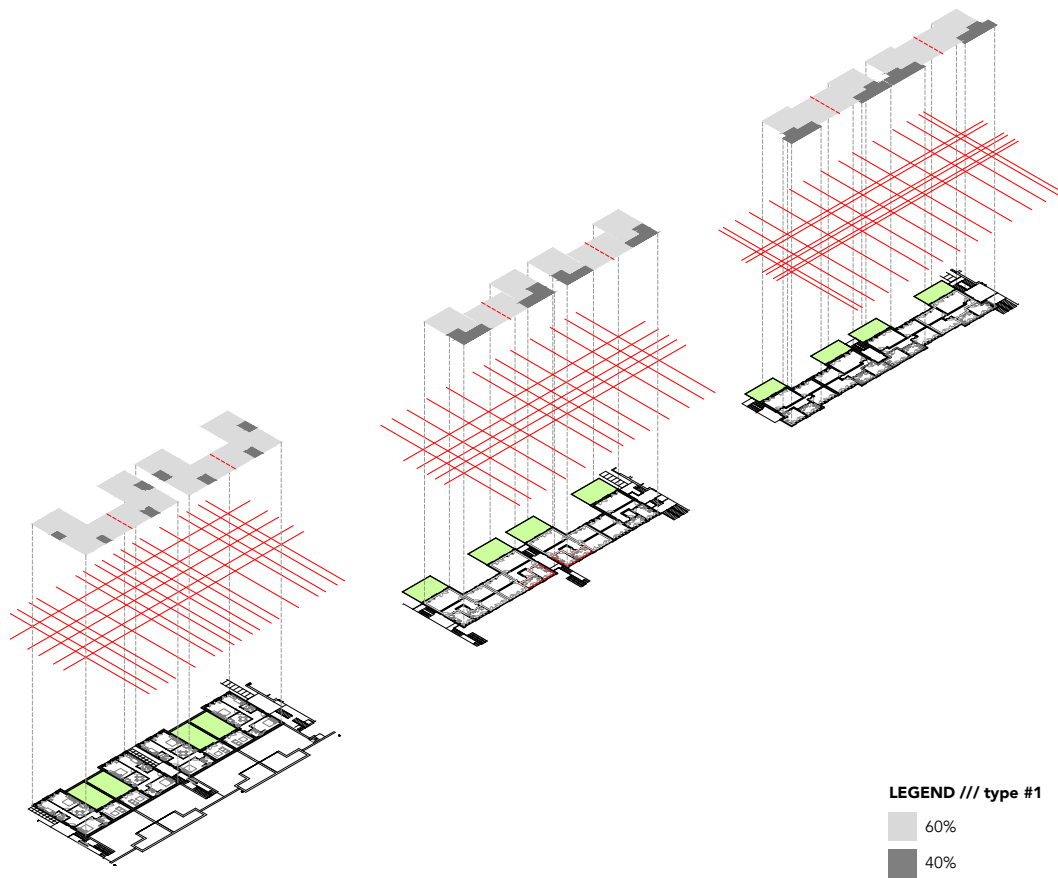


Figure 51: Plan-based analytical diagrams of Villaggio Matteotti's typologies showing in lighter gray the areas where users can appropriate the design

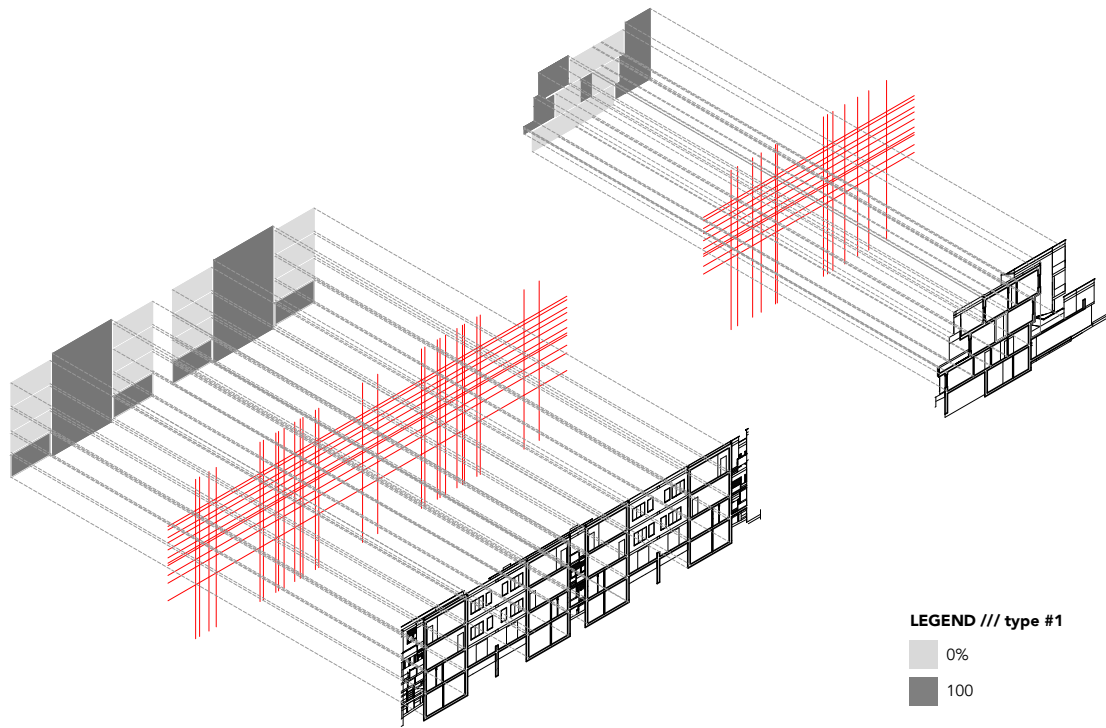


Figure 52: Section + Facade-based analytical diagrams of Villaggio Matteotti's typology 1 showing in lighter gray the areas where users can appropriate the design

The participation spectrum results for Villaggio Matteotti, displayed on Table 8 and Figure 54, reflect the application of a participatory design methodology by Giancarlo de Carlo. Furthermore, it incorporates user interviews and data collected by Bracco, et al. (1977), concerning the phases of the project development.

At the typology category, the interior unit of analysis scored **five (5)**, justified by the incorporation of a free plan that allowed from sixty (60%) to seventy (70%) percent of customizable area for the residents depending on the typology. The exterior, highly dependable of the frame, did not allow for the customization of the facades, ranking **minus five (-5)** on the soft & hard point scale.

Regarding the project's belonging classification, urban insertion and unit composition received a score of **minus one (-1)**, considering the fact de Carlo decided every aspect of the projects' location and disposition along with the future residents, listening to their opinions.

The score for the needs program unit was **five (5)** because of two main conditions: first, the amount of interior space allowed for modification, and second, the variety of possible layout options (45) offered by de Carlo. This soft score derives completely from the participatory design process that allowed residents to feel satisfied under the conditions of the design.

Lastly, the category of autonomy scored **minus five (-5)** on both units of aesthetics and design, due to the impossibility of changing the exterior aspect of the building typology. The exterior aesthetics of the project is completely regulated by its frame, privileging a uniform collective appearance, as seen on Figure 53.

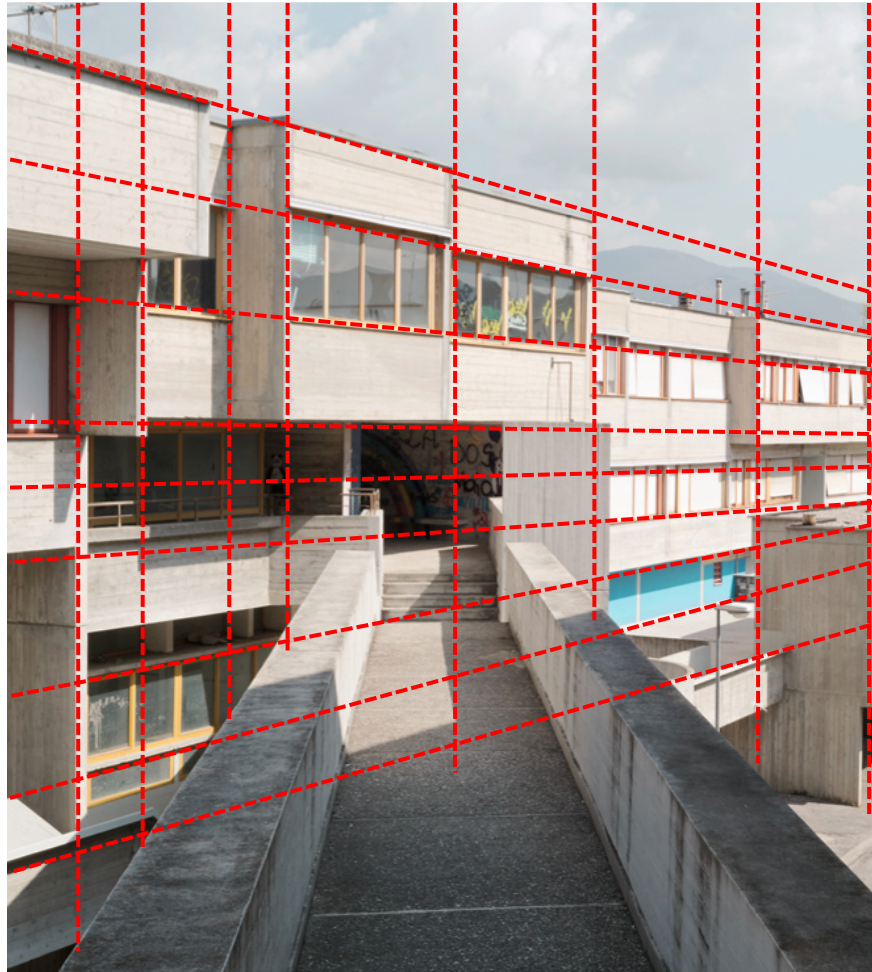


Figure 53: Villaggio Matteotti exterior aesthetic, subordinated to its frame. Reprinted from Vitali, Positano, & Cambiaggi (2018) and edited by the author

These values place Villaggio Matteotti as **hard** scheme for social housing (see Figure 55), with a participation spectrum mean of **minus one (-1)**. This conclusion is evident when looking at the radar chart of the project, which shows six of the seven units of analysis scoring on the negative side of the soft & hard point scale. Yet, it is important to observe that the residents themselves adjusted and agreed with this level of rigidity after several meetings with Giancarlo de Carlo. (Bracco, et al., 1977; Zucchi, 1992; Vitali, Positano, & Cambiaggi, 2018).

VILLAGGIO MATTEOTTI (1974)		
PARTICIPATION SPECTRUM	SCORE	CATEGORIES
Interior	5	typology
Exterior	-5	
Urban insertion	-1	belonging
Unit composition	-1	
Needs program	5	inclusion
Aesthetics	-5	autonomy
Design	-5	
PARTICIPATION MEAN	-1	

Table 8: Participation spectrum score for Villaggio Matteotti

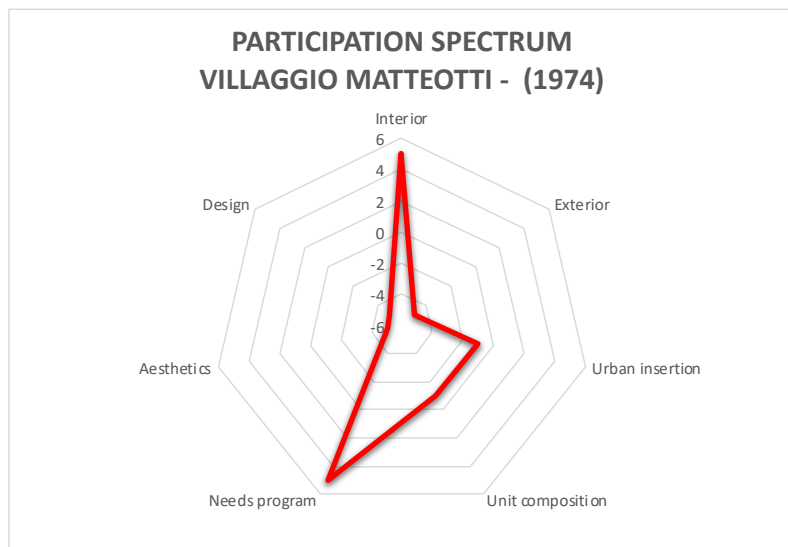


Figure 54: Radar chart showing the performance of Villaggio Matteotti generated from Participation Spectrum score

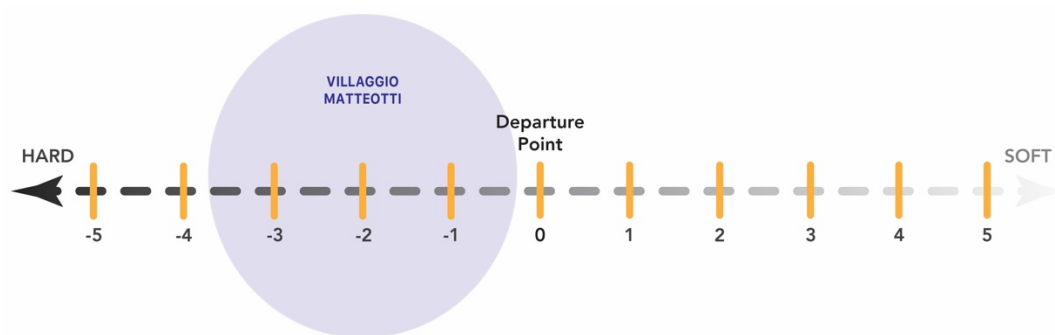


Figure 55: Soft & Hard mean for Villaggio Matteotti

Quinta Monroy (2003)

This is Elemental's first built social housing project. Located in Iquique, Chile, Quinta Monroy incorporated the users' input established a framework that allowed users to build half of their house⁴¹. This project started a trend of proposals that would end up qualifying the Alejandro Aravena as one of the most prominent figures in social housing design in Latin America and around the world in the contemporaneity, conferring him the 2016 Architecture Pritzker Prize⁴².

⁴¹ Aravena called this methodology the "Half-house". In his words, the architect would provide 50% of the design, and the residents would complement the other 50%. (Aravena & Iacobelli, 2012)

⁴² The Pritzker Prize jury announcement emphasized that Aravena "is leading a new generation of architects that has a holistic understanding of the built environment and has clearly demonstrated the ability to connect social responsibility, economic demands, design of human habitat and the city. (...) The younger generation of architects and designers who are looking for opportunities to effect change, can learn from the way Alejandro Aravena takes on multiple roles instead of the singular position of a designer to facilitate a housing project, and by doing so, discovers that such opportunities may be created by architects themselves. (...) Through his approach, he gives the profession of architect a new dimension, which is necessary to respond to present demands and meet future challenges of the field. He epitomizes the revival of a more socially engaged architect, especially in his long-term commitment to tackling the global housing crisis and fighting for a better urban environment for all." (Pritzker Prize Jury, 2016, pp.1-5)

Historical context

In 2002, the Chile Barrio Program⁴³ commissioned the office Elemental⁴⁴, with a social housing project undertaking an informal settlement called Quinta Monroy, at the core of the city of Iquique, in Chile. As mentioned before in the literature review, Chile stands out in Latin America as the only country that advances social housing policy towards inclusivity and exploration⁴⁵. The project for Quinta Monroy ended up being part of a new housing policy that the MINVU⁴⁶ was about to launch: the Vivienda Social Dinámica sin Deuda - VSDsD (*Dynamic Debt-Free Social Housing*). Aravena & Iacobelli (2012,) detailed the VSDsD as:

(A program) aimed at the poorest strata of society, those with no debt capacity. It consisted of a subsidy of US\$ 7,200 per family, with the addition of US\$ 300 of savings. With this combination of subsidy and savings adding up to US\$ 7,500, the site, infrastructure, and house had to be covered. In a best-case scenario this amount translated into a dwelling of around twenty-five to thirty square meters. Although the family owed nothing to the state, the low amount of the subsidy forced the beneficiaries to transform the meager housing solution into a decent home. Thus, the origin of the program's name: dynamic, debt-free. (p.31)

⁴³ Chile Barrio was a program created in 1997 as “a strategy to overcome poverty in an integral manner”. (Jirón, 2004) By relocating existing resources in the government, it was directed to intervene in illegal settlements, understand their context, and integrate them by relocation or reinsertion in the urban fabric that they already occupied.

⁴⁴ Elemental was a "Do Tank" firm founded in 2000 by Alejandro Aravena, Andrés Iacobelli, and Pablo Allard. In 2010, Iacobelli was appointed Vice Secretary of Housing resulting in a change in the team, that incorporated Gonzalo Arteaga, Juan Ignacio Cerda, Victor Oddó, Diego Torres, and Christian Martinez. The office embraced the emphasis of a Do Tank firm, which meant implementing the common good by working in compliance with the restrictions of a determined problem (social, political, legal, economic, among others (Aravena & Iacobelli, 2012).

⁴⁵ Jirón (2004) and (Rolnik, 2009; 2014) mention this pionerism in their research.

⁴⁶ MINVU is the acronym for Ministerio de Vivienda y Urbanismo de Chile (*Ministry of housing and urbanism of Chile*).

This new policy provided the “perfect storm” for Elemental’s approach; the office would be able to test new strategies and projects for Quinta Monroy.

Site context

Before Quinta Monroy become the name for Elemental’s housing project, it was an informal settlement (see Figure 56) located in the center of Iquique, 1,500 kilometers north of Santiago (Aravena & Iacobelli, 2012). Corroborating the trend of informality growth throughout Latin America, the site started receiving temporary housing in late seventies, authorized by the land’s owner, Ernesto Monroy. The settlement grew over the years following the common logic of favelas occupation: subdivision of lots and expansion of the initial housing cells to accommodate relatives and other tenants.



Figure 56: Street view from Quinta Monroy settlement in Iquique, before intervention. Reprinted from Aravena & Iacobelli (2012)

With Ernesto Monroy’s death in 1995, the residents starting pleading their property rights amongst a dispute over the ownership of the site between Monroy’s heirs (Aravena & Iacobelli, 2012). This dispute over the site represented a valid quest for the right to the city by the residents, whom in thirty years living there had grew a community in a lot closer to services and infrastructure.

Aravena & Iacobelli (2012), detailed the residents’ five years pursuit:

During this time (five years), the whole housing committee of the Congress, the housing minister, the municipality, members of the Parliament, and other authorities visited the site, yet no solution could be found. This long frustrating process created distrust and conflict among the families. However, an important group of occupants stayed firm in their decision to fight for where they lived. (pp. 85-86)

In 2000, a state intervention through Chile Barrio purchased the site, shown below in Figure 57, with the aim of building housing units for the families living in the settlement. Chile Barrio national director, Silvia Araos, hired Elemental hoping that they could offer a design solution to the house the one-hundred families of the last informal settlement in the center of Iquique (Aravena & Iacobelli, 2012).

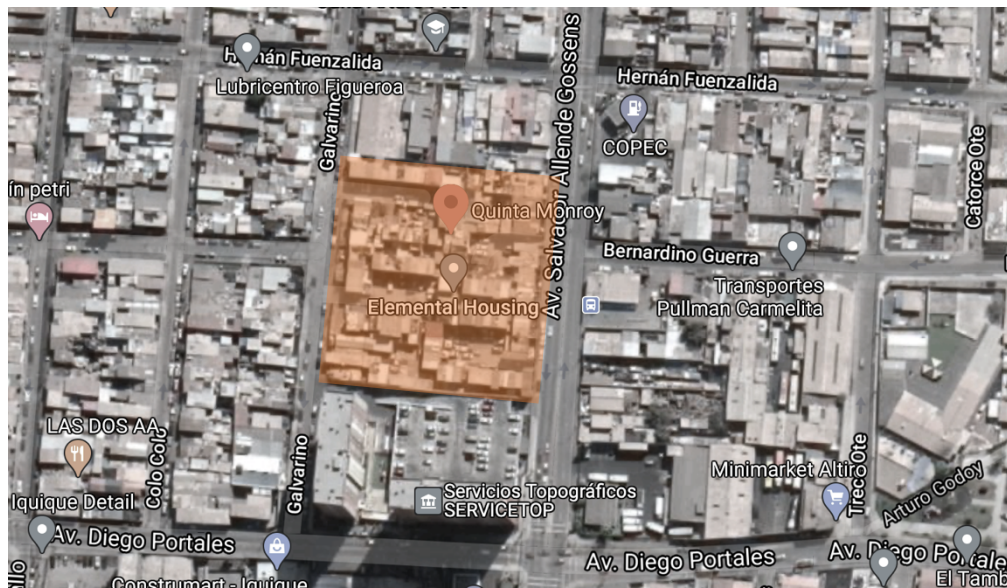


Figure 57: Quinta Monroy's site in the center of Iquique. Google Maps (2020). Accessed on July of 2020

Architectural theory

Even before starting the project of Quinta Monroy, Aravena, Iacobelli and Allard were invited to teach at Harvard GSD. From 2001 to 2003 they taught architecture studios investigating social housing proposals, and these experiences rendered one conclusion: a social housing design should be able to expand. The team then created what they called “Parallel Building” (depicted in Figure 58):

(...) a house running parallel to an apartment above. In reality, this was nothing new. It was an updated version of the typical two-story house of colonial Latin America that has two doors for each lot facing the street: one leading to the house and then the courtyard and the other that opens onto a staircase taking you to the upper floor unit. **Our only contribution was to make the house “porous” so that it allowed the expansions to occur in the “pores” within the building volume.** (Aravena & Iacobelli, 2012, p.37)

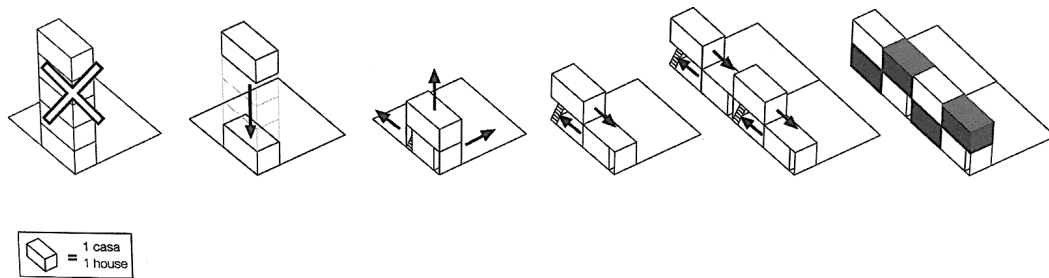


Figure 58: Parallel Building concept developed by Elemental in 2001. Reprinted from Aravena & Iacobelli (2012)

Here I make my biggest critique of Aravena’s design philosophy for social housing; the unquoted theories that neither him nor the rest of the Elemental team acknowledge applying to their design. It is interesting to observe that by understanding the need for expansion and porosity, he was already designing an open building system

with the concept of the *Parallel Building*. However, Habraken's (1972) theories on support structures do not appear as a reference. To grasp the concept of incrementality⁴⁷ the office analyzed case studies of social housing projects in Latin America, but never mentioned canonical the works by Turner (1972; 1976) or Ward (1976), who had profound influence in Latin America, as discussed in this dissertation. Finally, while he acknowledged the use of participatory design, yet without referring the contributions of Giancarlo de Carlo (1980) or Hamdi (1995).

Despite the apparent unquoted theories of his solution, Aravena's role in contemporary Latin American social housing is essential. One of the most relevant contributions of Alejandro Aravena was the recovery of the discussion about the social responsibility of architecture and most importantly, of the architect. Although he never mentioned the theories that surround his approach, his discourse brought these theories to light once again. Elemental also attained the materialization of a project that acknowledges the need for individual identity regardless of the income level. The discovery of the need for a "middle class DNA" (Aravena & Iacobelli, 2012) comes as no surprise in a context where owning a house is perhaps the biggest realization of a lifetime⁴⁸. This "DNA" relates to the possibility of reaching a more customized aesthetics for the house based on elements that the residents understand as pertinent to reach an aesthetics that relates to this income level. Through the participatory design

⁴⁷ The literature review chapter of this document provided the key differences between self-help and incremental housing.

⁴⁸ The importance of homeownership and private property is a characteristic that is observed across Latin America (Balchin & Stewart, 2001; Morado Nascimento, 2011; Aravena & Iacobelli, 2012; Rolnik R. , 2014).

process, Aravena (2004) identified that the residents were interested in being able to highlight their house amongst the others, to have access to their individual identity in their own terms.

Project analysis

Faced with a limited budget of US\$ 7,500 per family while maintaining the original site of Quinta Monroy, the premise of the project was to innovate by combining typologies that could be expanded by the residents. Hence, instead of designing a small house of 30 sqm, they provided a middle-income home, with the first cell representing the beginning of that investment, which would be finished at 72 sqm (Aravena & Iacobelli, 2012). Using the *Parallel Building* as their initial design framework, through a participatory process, the architects identified the basic needs for the group of families, which consisted of five conditions:

1. Structural skeleton of the house (frame)
2. Kitchen
3. Bathrooms
4. Stairs
5. Partition walls

These elements, which the residents would not have the technical knowledge to execute safely and accordingly to code would also help them achieve a "middle-class DNA". This DNA related to the median size and aesthetic appearance of the other neighborhood houses, as presented in Figure 59.



Figure 59: Middle class neighborhoods from Iquique, demonstrating the DNA aimed by Quinta Monroy residents. Reprinted from Aravena & Iacobelli (2012)

When defining the site plan (Figure 60), the architects prioritized a series of courtyards that would be the collective spaces, avoiding narrow and dark streets that favored crime and drug dealing at the settlement.



Figure 60: Site plan of intervention for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)

For the typology intervention, the architects defined the ground levels for the houses, and the upper levels for the apartments, showed in Figure 61. They also defined a frame within this organization, which will allow for the house expansion and customization, displayed on Figures 62 and 63.

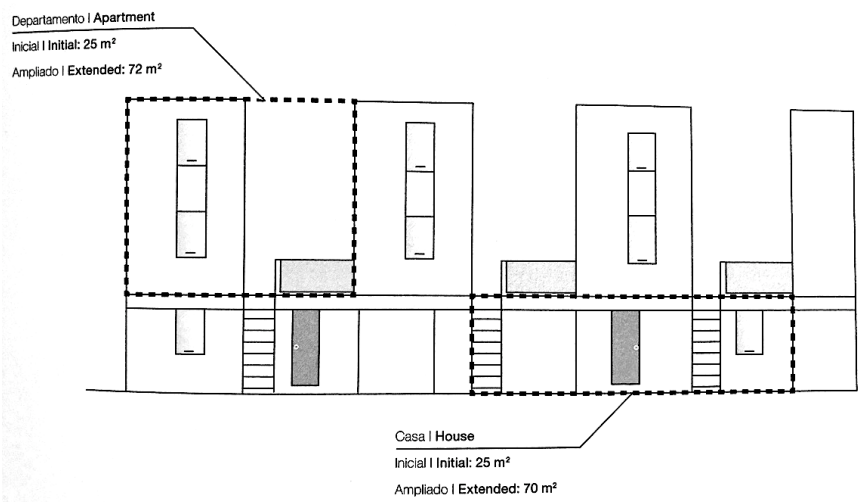


Figure 61: Typology organization for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)

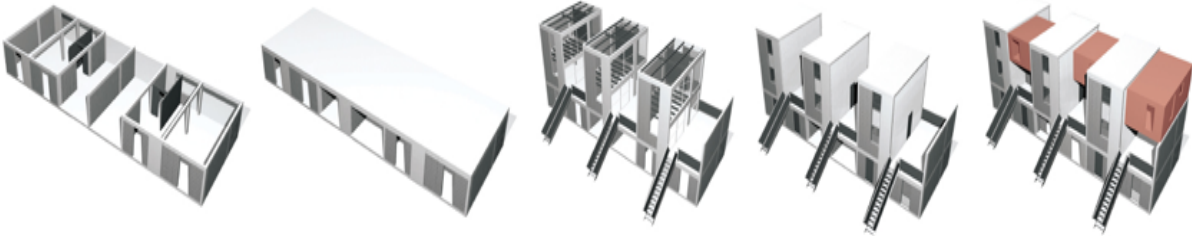


Figure 62: Typology expansion for houses and apartments for Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)



Figure 63: Before and after showing the result of user's appropriation of the design. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)

Participation spectrum assessment

Quinta Monroy's performance assessment was based on the floor plans and facades of two different typologies designed by Elemental for the project. To establish a spatial understanding of how participation elements can function in the project, I generated analytical diagrams from the drawings.

This analytical representation allowed me to calculate the project's ratio of the area permitted for the users to appropriate and apply this percentage according to the soft & hard point score.

The diagrams shown below in Figures 64 and 65 display three levels of information for Quinta Monroy:

1. The projects' floor plan (the generator), displayed in black and white;

2. The modular organization (the frame), shown in red;
3. The distribution of areas where users can appropriate the design is presented in two gray shades. The lighter shows area subject to appropriation, whereas the darker displays fixed spaces, immutable in the design.

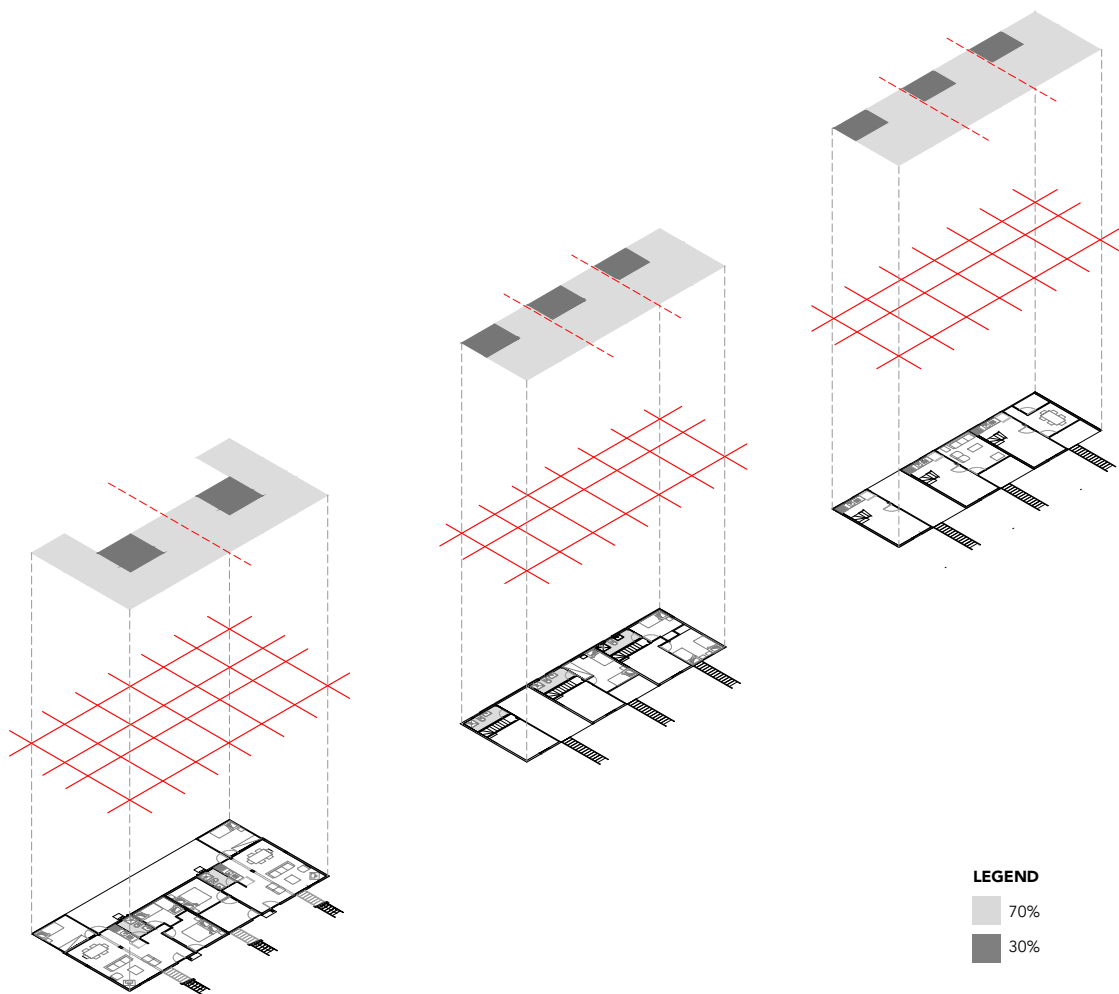


Figure 64: Plan-based analytical diagrams of Quinta Monroy (2003), showing in lighter gray the areas where users can appropriate the design

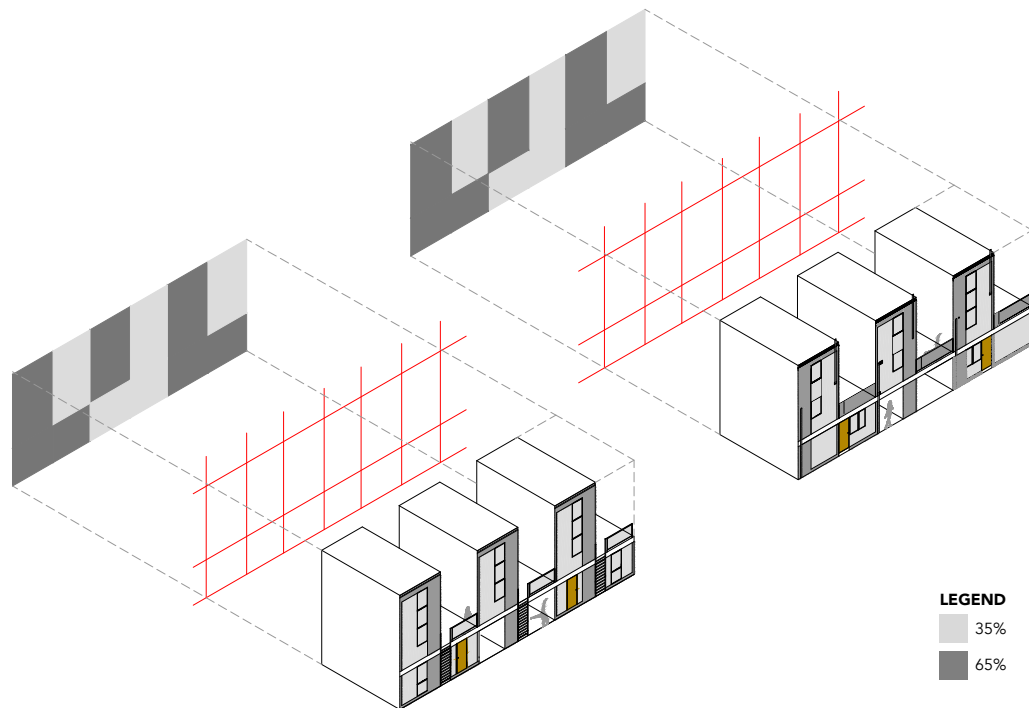


Figure 65: Façade-based analytical diagrams of Quinta Monroy (2003), showing in lighter gray the areas where users can appropriate the design

The participation spectrum results for Quinta Monroy, depicted respectively on Table 9 and Figure 68, reflect the theoretical propositions of Elemental, and the post occupation data provided by the residents presented by Aravena & Iacobelli (2012). Due to the nature of the projects' philosophy of "half-house", the plan, imagined as an open building structured, allows for over fifty percent (50%) of its area for user's transformation on its interior amounting to a score of **five (5)**. For the exterior, thirty-five percent (35%) of the typology's façade allow customization, placing this unit of analysis at **two (2)** in the soft & hard scale.

Regarding the project's belonging category, urban insertion received a score of **four (4)**, considering that residents already occupied the site before the Chile Barrio

Program. The fact that the residents were able to maintain their place of choice for living is a great accomplishment, subverting the pattern of public programs in Latin America, especially those dealing with relocation of informal settlements.

On the other hand, unit composition scored at **minus five (-5)** because although the architects employed participatory design to understand the residents' needs, the typological result of this process was presented to the residents as a final result. There is also a very clear limit for the expansion of the housing units embedded in the project's organization, making impossible any change pertaining the position of the housing units in the site.

The inclusion category ranked **five (5)**, demonstrating the complete power of decision of the residents regarding their needs for the houses. The participatory design strategy applied by the architects achieved such an in-depth level of user understanding that it uncovered a "middle class DNA" as a denomination of their needs.

Finally, the autonomy category and its respective variables of aesthetics and design scored **four (4)**. Although the percentage allowed for exterior modification from the ratio calculation was thirty-five percent (35%), ranking the exterior unit of analysis a **two (2)**, when considering design and aesthetics, we look to the house as a whole, not as a half. Since Elemental delivered their "half" of the house as bone structure (see figure 66) concerning all the categories analyzed in this study, the overall aspect of the design after customization could be significantly different from the architect's understanding, as shown in the image below. This possibility of generating new design and aesthetics from

the inhabitants' perspectives (see Figure 67), reinforces the softness of the parti, justifying the higher score for these units of analysis.



Figure 66: Unfinished project from the architects' perspective. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)



Figure 67: A finished house from a residents' perspective. Quinta Monroy (2003) by Alejandro Aravena. Reprinted from Aravena & Iacobelli (2012)

These values place Quinta Monroy as **soft** scheme for social housing, depicted in Figure 69, with a participation spectrum mean of **two point seventy-one (2.71)**. When looking at the radar chart of the project, six of the seven categories of the spectrum scored on the positive side of the soft & hard point scale.

QUINTA MONROY (2003)		
PARTICIPATION SPECTRUM	SCORE	CATEGORIES
Interior	5	typology
Exterior	2	
Urban insertion	4	belonging
Unit composition	-5	
Needs program	5	inclusion
Aesthetics	4	
Design	4	autonomy
PARTICIPATION MEAN	2.714286	

Table 9: Participation spectrum score for Quinta Monroy

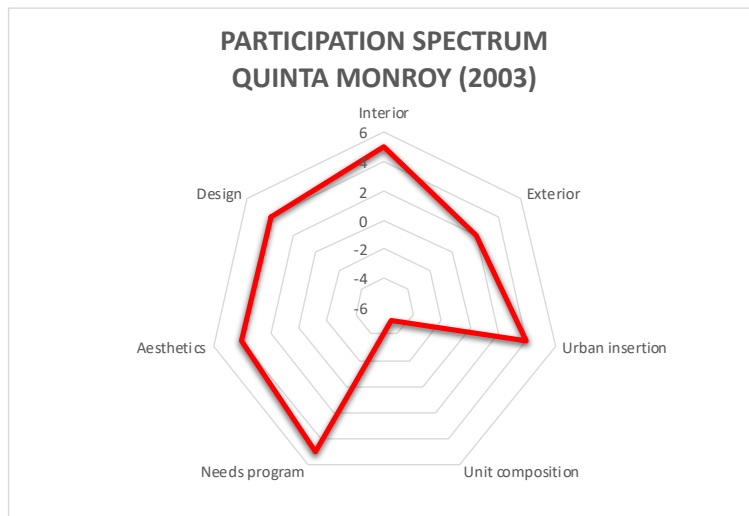


Figure 68: Radar chart showing the performance of Quinta Monroy generated from Participation Spectrum score.

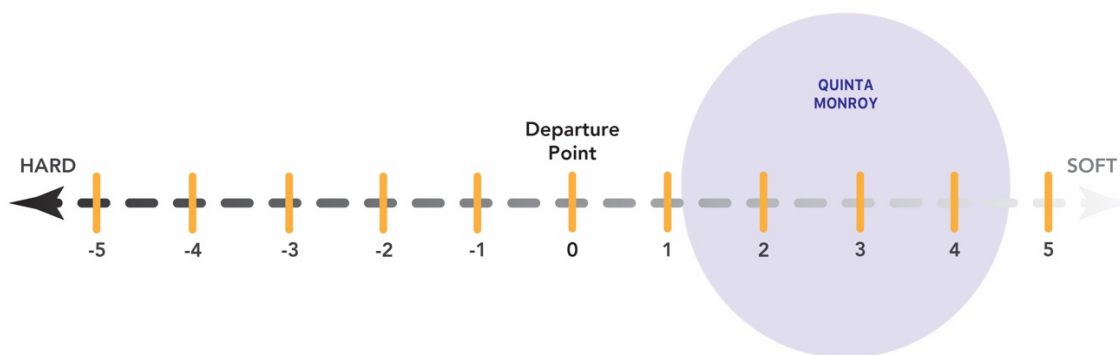


Figure 69: Soft & Hard mean for Quinta Monroy

CHAPTER V

CONCLUSIONS

Introduction

Throughout this research, I have focused on examining the dynamics of open building, self-help, and participatory design as elements of participation applied to social housing projects. Within a methodology combining logical argumentation and case study analysis, I also observed the transformations regarding theoretical discourse and the role of architects on social housing.

This conclusion chapter presents three sections. The first discusses the answers for the research questions posed at the beginning of this dissertation, also summarizing the findings from the case study analysis. The second presents the contributions of this study: a framework for social housing design applying the theoretical concepts discussed in the research, and an experimental design output generated from the framework. Finally, the third offers recommendations for future research on social housing.

Research Question One

How can open building, self-help, and participatory design act as a framework for social housing design?

*I am everything and nothing
You have me every day
But you don't know if it's good or bad
However, know that I am in you
From the tiles, I'm the roof*

*I am the owner of the house
I am the beginning, the end, and the middle*

- Raul Seixas, *Gita*, 1974

During the second phase of the case study analysis, one particular element stood out on all four housing designs: the **frame**⁴⁹. Perhaps the most important component present across the four projects analyzed in this dissertation, it is an element that has dual embodiment; it can be literal or implied, material or theoretical, open or closed. Its versatility and familiarity within Latin America qualifies this element as the core component of the framework that will encompass the elements of participation. Thus, **the frame is the element that will serve as a vessel to incorporate open building, self-help and participatory design. It is a mediator** that will adjust based on the soft & hard score, encompassing the spectrum of autonomy and spatially organizes both the architect and the user's contribution; through it, participation can happen, implicitly and explicitly.

A canonical element in architecture, the frame embodies even more significance in the context of housing. Marc-Antoine Laugier described an idea of frame applied to housing in his *Essai sur l'architecture* of 1753, when referred to a man in his primitive state in search of a shelter. A representation of this primitive hut was illustrated by

⁴⁹ The frame can also be understood as a consequence of the grid. Ching (2007, p.72) defined the grid as “a system of two or more intersecting sets of regularly spaced parallel lines. It generates a geometric pattern of regularly spaced points at the intersections of the grid lines and regularly shaped fields defined by the grid lines themselves.”

Charles-Dominique-Joseph Eisen (1720–1778) in the frontispice of the second edition of Laugier's essay. Eisen's engraved representation is depicted in Figure 70.

The man is willing to make himself an abode which covers but not buries him. Some branches broken down in the forest are the proper materials for his design. **He chooses four of the strongest, which he raises perpendicularly and which he disposes into a square. Above he puts four others across, and upon there he raises some that incline from both sides.** This kind of roof is covered with leaves put together, so that neither the sun nor the rain can penetrate therein; and now **the man is lodged.** (p.10, 11)

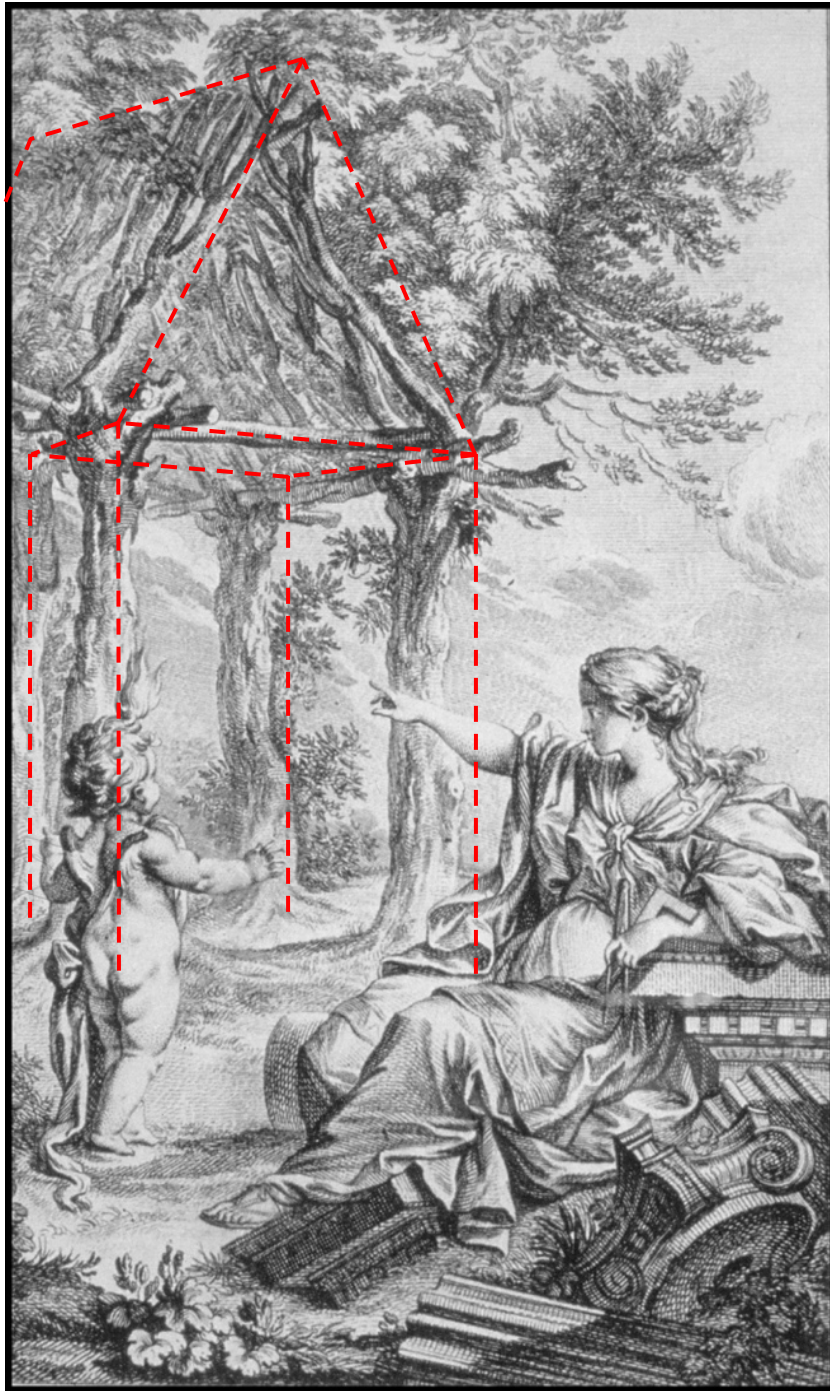


Figure 70: Charles-Dominique-Joseph Eisen (1720–1778), Frontispice from *Essai sur l'architecture*, second Edition, 1755. Engraving at <https://drawingmatter.org/other-lives-charles-eisen-and-laugiers-essai-sur-larchitecture/>

The same way, Colin Rowe (1966), emphasized its importance for the discipline of architecture, as a catalyst element with the capacity of transcend its structural function and become an embodiment of architectural character.

Apparently, the neutral grid of space which is enclosed by the skeleton structure supplies us with some particularly cogent and convincing symbol, and for this reason **the frame has established relationships, defined a discipline, and generated form. The frame has been the catalyst of an architecture; but one might notice that the frame has also become architecture, that contemporary architecture is almost inconceivable in its absence.** (...) it might be fair to say that the frame has come to possess a value for contemporary architecture equivalent to that of the column for classical antiquity and the Renaissance. Like the column, the frame establishes throughout the building a common ration to which all the parts are related; and, like the vaulting bay in the Gothic cathedral, **it prescribes a system to which all parts are subordinate.** (Rowe, *The Mathematics of the Ideal Villa*, 1966, p.90)

Understanding the frame as an essential part of social housing design leads to the realization that it is time to rethink the concept of good and bad when classifying social housing projects. These denominations presuppose that there is a definitive design answer to the issue, and as I demonstrated and discussed throughout this study, this position it is simply not sustainable. That is why the frame becomes such a crucial element in social housing. At the same time that defines participation from the bottom-up in a clear and organized manner, offers infinite spatial possibilities. This became clear when analyzing the case studies. Just because a project falls under the hard side of the score, it does not mean that is wrong, the same way that softer solutions are not automatically right. The application of the frame informed by the soft and hard scale

serves precisely to mediate the necessary level of softness or hardness required by each context and inhabitant, preserving the diversity necessary for a complex subject like this.

Research Question Two

What is the contemporary architect's role in social housing production?

The case studies' analysis demonstrated that depending on the context, there is a tuning of the contribution of users, architects, and the frame in how much appropriation will the design afford. This proves that what makes social housing design most effective is the adaptation of the solution to the context, embodying levels of collaboration that are comfortable to the inhabitants. That's why the **Soft & Hard Score** is so important. It confers the flexibility needed to achieve the balance of each input, and thus arrive at a project that truly represents the characteristics of the inhabitants while still advancing architecture.

Therefore, the answer to the second research question touches not only on the redefinition of the architect's role, but also of the users and of the frame. Architects must act as **enablers**, users as **collaborators**, and the frame as a **mediator/interface** of them, composing **three forces** acting within the social housing design. These three forces will navigate the Soft and Hard Score and adapt according to specific project and cultural needs that will be identified at the beginning of the design process and collaboration, as demonstrated in Figure 71. It is interesting to observe the elasticity of the three forces on all of the case studies without interpreting the designs as *better* or *worse*, *right* or *wrong*,

but rather observing how they incorporated the context and housing problem, and how residents reacted to it.

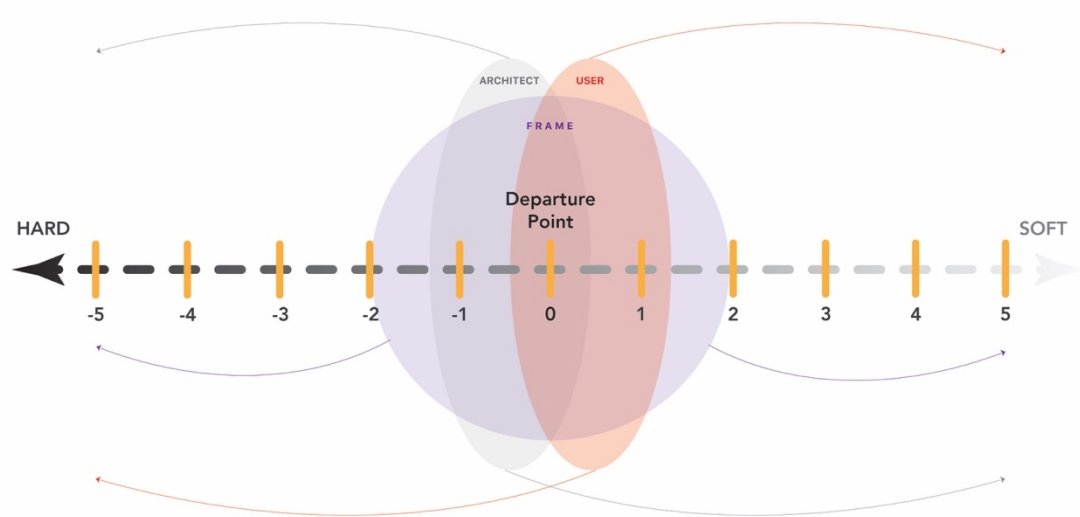


Figure 71: Diagram showing how the roles of architect, users, and the grid adjust using the Soft & Hard Score

On Pessac and Villaggio Matteotti for instance, the interior frame applied on the floor plan, allows more opportunity for appropriation, falling on what I coined in this work as a **Soft** approach. In contrast, the exterior frame, encompassing the façade, has almost no space for user’s modification. The exterior of these projects followed a **Hard**⁵⁰ strategy, where the architects’ decision on design and aesthetics was dominant. In these cases, user’s contribution focused on the interior frame, and the architects on the exterior frame. It is noteworthy observing how there is a clear limit amongst the forces (architect, user, frame) within their space of customization following an interior versus

⁵⁰ Schneider & Till (2005, p.7) noticed that in design systems that exploit modularity and service strategies, “the technological solution is the prime motivation and determinant of the housing design.”

exterior dynamic. Figure 72 illustrates this relationship between frames, architects, and users.

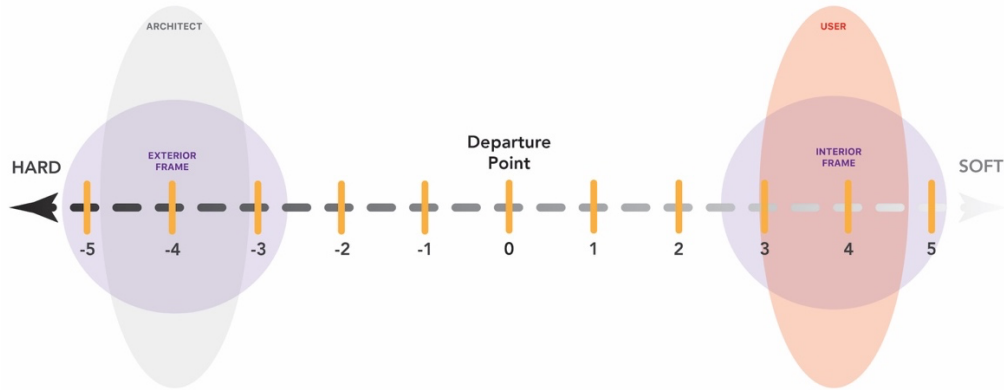


Figure 72: Diagram showing the distribution of roles within Pessac (1926), and Villaggio Matteotti (1974)

On the other hand, when looking at Maison Dom-Ino and Quinta Monroy, both interior (floor plan) and exterior (façade) frames fall on the **Soft**⁵¹ side of the score, as shown in Figure 73, consequently allowing significant more contribution from the users. Interior and exterior in these projects, although very clearly defined by the frame, promote an overlapping of roles and contributions, reinforcing the indeterminate aspect of the design.

⁵¹ In this case, the technology equips the project to “unfold in a manner not completely controlled by the foreground of construction techniques” (Schneider & Till, 2005, p.7)

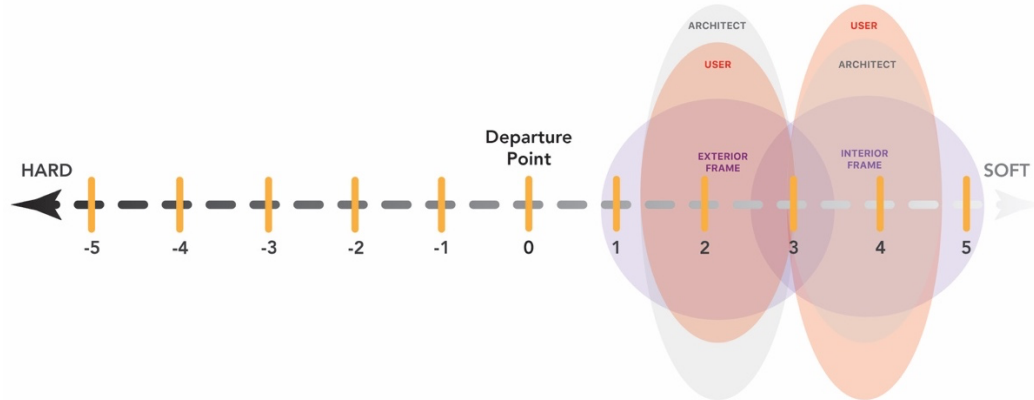


Figure 73: Diagram showing the distribution of roles within Maison Dom-Ino (1914), and Quinta Monroy (2003)

This elasticity amid enabler (architect), collaborator (user), and mediator (frame) on the projects also allows the observation of levels of **individual and collective identity**. In the cases of Pessac (1926) and Villaggio Matteotti (1974), the individual and collective identities are once more divided between interior (individual), and exterior (collective). Thus, the external appearance of the project is usually conserved by the users, following the architect's aesthetic thinking, still being able to experience moments of transgression as showed in Figure 74.

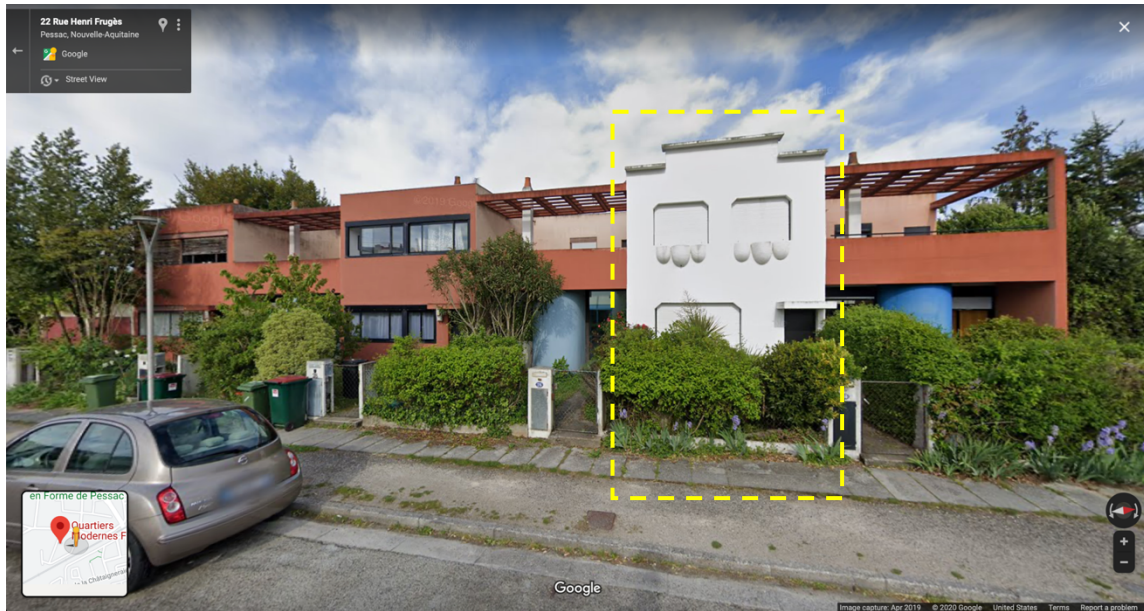


Figure 74: User customization on the exterior of one of Pessac's (1926) houses. Google (2019). Accessed on August of 2020

In contrast, Dom-Ino (1914) and Quinta Monroy (2003) are designs where individual identity transposes interior and exterior, and generates a collective image of diversity. This mixture of aesthetics interpretations promotes a vision of sensibility and architectural culture (seen demonstrated in Figure 75 in Quinta Monroy) that embodies what Jonathan Raban advocated in his book, *Soft City* (1974, p.12) when said: “the city (housing) goes soft; it awaits the imprint of an identity. For better or for worse, it invites you to remake it, to consolidate it into a shape you can live in.”



Figure 75: User customization on the houses at Quinta Monroy. Google (2015). Accessed on August of 2020

Soft & hard Framework: Enablement and Flexibility Towards Design

The Soft and Hard Framework, showed in Figure 76, aims to facilitate the collaboration during all the phases of the social housing design, and ultimately promote more equality while articulating the concepts presented in this study:

- The elements of participation: *open building, self-help, and participatory design.*
- The three forces that act in social housing design: *architects, users, and the frame.*

The diagram below details the process by which all of these elements can be combined during all phases of a social housing design. It defines a dialogue amongst

architects and users mediated by participatory design at the beginning of the process, in order to establish trust and understand their individual and collective needs. After that, the architects present an initial design encompassing frame, open building, and self-help strategies that will be refined by the users, once more through participation.

This adjusted frame will then be refined once more by architects and users, until, reach the final project stage; a collaboration between forces that materializes a shared vision of social housing design, pertinent to its context and its people.

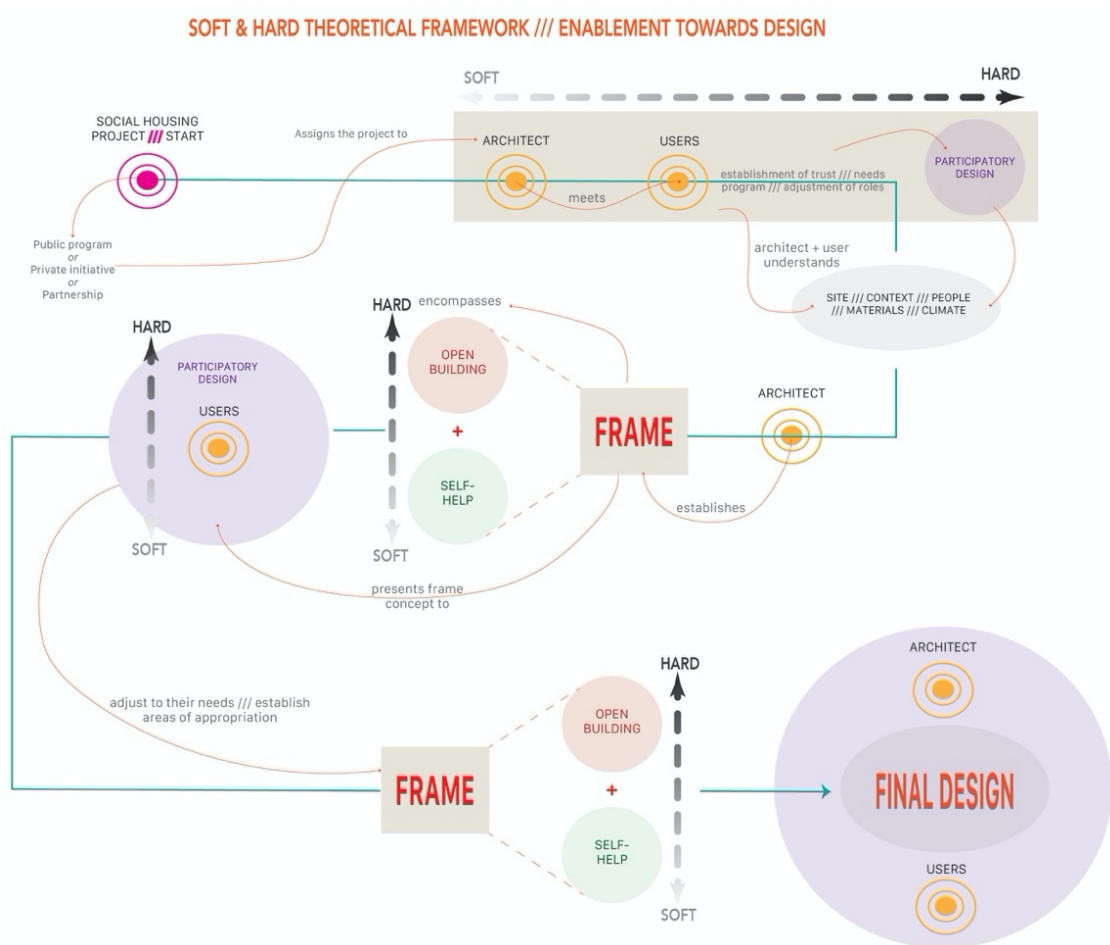


Figure 76: Soft & Hard Framework

The Flex House: An Experimental Design Output

*There's a little village over there
Where good wind blows
At the balcony, who rests
Sees the horizon lie on the ground
To calm the heart
There the world is right
Land of heroes, home of mothers
Paradise moved there
Above the houses, lime
Fruits in any yard
Full breasts, strong children
Dreams sowing a real world
Every people fit there
Palestine, Shangri-la
There, time waits
There is Spring
Doors and windows are always open
For the luck to come in
In all the tables bread
Flowers decorating
The paths, the dresses
The destinations, and this song*

Marisa Monte, Vilarejo (2006)

Marisa Monte's song, *Vilarejo (Village, in free translation)*, describes a utopic place where the house is the protagonist of people's lives. Good houses enable people to thrive, and as a result, cities grow healthier. It is instilled by this feeling that this design experiment is born. It attempts to generate a home, and consequently, a community.

Using the Soft & Hard Framework presented on the last section, the Flex House⁵² is an experimental design output applying the concepts proposed in this study. Using a frame⁵³ as its main structural and organizational system, it proposes an open system where flexibility of plan distribution and envelope act as the main points of the design.

The Flex House aims to explore the possibilities of the frame (see Figure 77), beyond the established visual of the slab on *pilotis*. The goal is to achieve a system that extends itself beyond the original structure, forming a grid that forecasts both the threshold and the expansion – how far the resident can go from his initial chosen housing module (Loureiro & Xavier, 2018). As demonstrated and discussed throughout this document, a complex subject like social housing does not benefit from a single architectural approach. Enablement and design need to adjust to each distinctive context, and the response should reflect the percentage of contribution deemed comfortable by the users. In this sense, using the frame as a generator offers the possibility of an open building system that is not completely programmed, but rather ready to be adjusted at the participatory design phase with the help of the prospective users.

⁵² A variation of this project was developed by the author for a social housing competition promoted by Codhab, the division of housing and planning of the Federal District, in Brazil. This variation was then presented and published in 2018, at *The Ethical Imperative*, 106th Meeting of the Association of Collegiate Schools of Architecture (ACSA). Parts of the conference paper proceeding are reprinted in this section with copyright permission from ACSA (2018).

⁵³ The frame of the project derives inspiration from the first case study of this dissertation: Corbusier's Maison Dom-ino, and as mentioned in the beginning of this chapter, it is the element that allows for the most balanced adjustment of the Soft & Hard Framework.

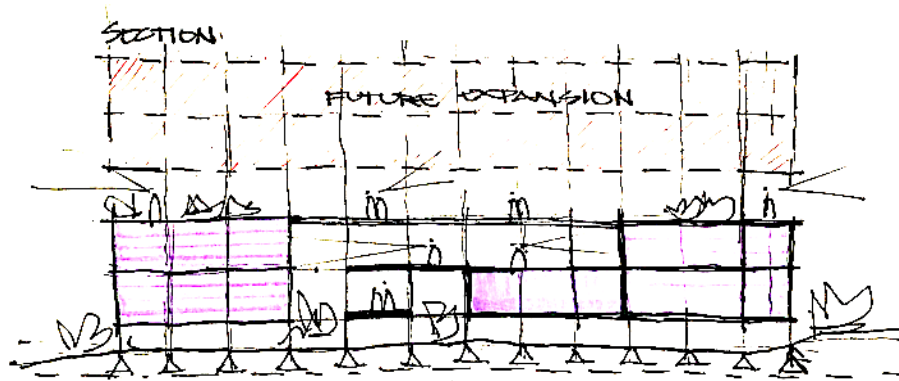


Figure 77: Sketch of the Flex House section demonstrating how the frame establishes the limits and possibilities of user occupation

The concept offers the residents possibilities of customization and future extensions of their units according to their interests, recognizing them as both clients and contributors. In addition, the project applies the redefinition of the architect's role as an enabler rather than a dictator of the habitat. Thus, housing is no longer seen only as a unit or a set of blocks, but instead appreciated as a part of the city, as a form of occupation, and contribution to the urban fabric. The house and its surroundings are investments that the residents will appropriate and develop according to their own language, however, respecting the structural grammar provided by the grid, displayed in Figure 78. As Raquel Rolnik (2016) noted, "our deficit is not only of houses, but also of city", and inside this motto, the proposal is treated as such; an intervention that is inserted in the urban fabric in order to be incorporated to its reality, and to establish not just houses, but a community.

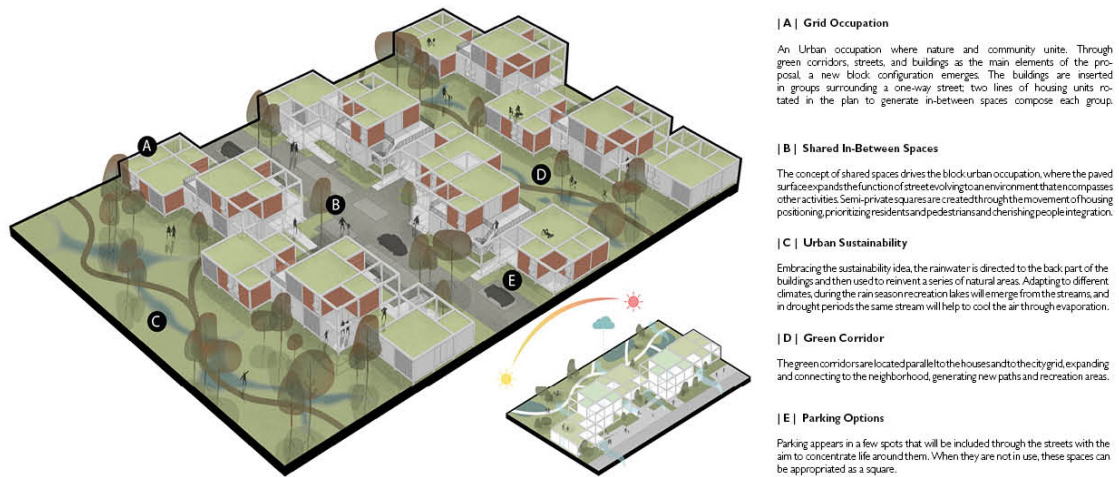


Figure 78: Image showing a variable of urban occupation of the Flex House. Drawing developed for the CodHab competition (2017)

The square module is the protagonist in the grid's individual scale since it has an easy suitability to every orientation and is independent of the site, being the first flexible element of the parti. The structures appear elevated from the natural site, as an adaptation strategy to different topographies. The modulation of 3,00 x 3,00 x 3,00 meters, shown below in Figure 79, has commercial and low-cost characteristics. It encompasses different technologies and travels easily from concrete – elected material for the proposal – to steel frame, or even wood, without the need to change the scaling and the original space organization.

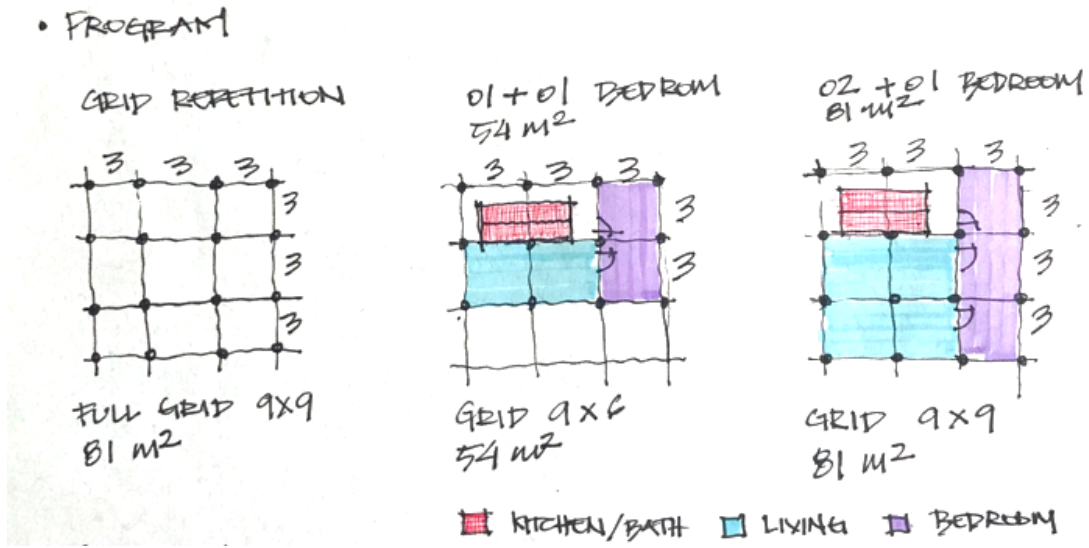


Figure 79: Sketch showing the module and possible house organization inside of the grid of the Flex House

This project decision reinforces once more the proposal's conceptual versatility, (displayed in Figures 80, 81, and 82) allowing the valorization of constructive techniques inherent to each location that might use it. Replicated in different directions inside the site, the module evolves into a grid that embodies not only to the city's heterogeneity but also to the families' diversity.

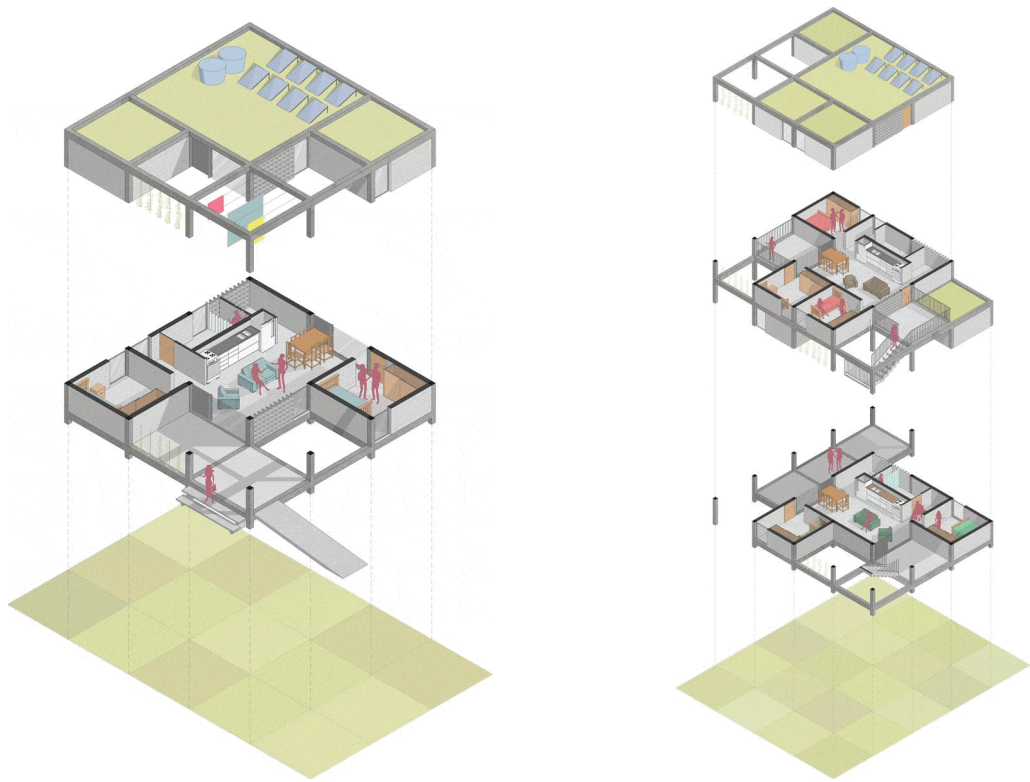


Figure 80: Image showing two different typologies generated from the frame: single family and row house

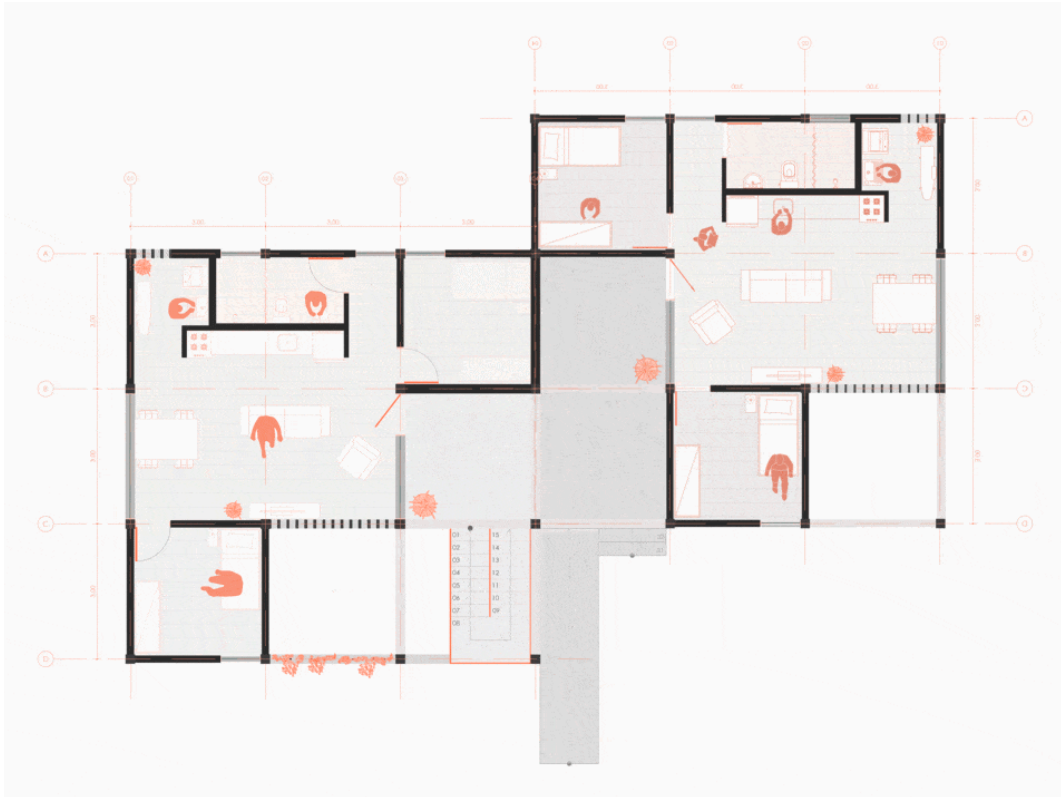


Figure 81: Image showing a plan composition for the Flex House



Figure 82: Renders demonstrating the aesthetic variety of appropriation that can happen in collaboration with the users

Future Avenues of Research

Future research to be developed from this work refers to:

- A. Multiple contextual analysis concentrating on expanding the discussion on enablement and elements of participation can compose an up-to-date scenario

of social housing around the globe. These analyses can be developed from two main points:

- a. **Understanding the temporal and cultural transformations in social housing design and its relationship with the elements of participation on other geographical contexts.** The inclination for self-help and appropriation present in the Latin American population positions this context as pertinent to integrate the elements of participation in social housing design. How much of this culture of appropriation replicates amongst residents from other hemispheres?
- b. **Expansion of the discussion of the architect's role as an enabler.** How much does this role adjust across different territories and populations? What is the relevance of the architect's figure on social housing depending on the context?

B. Advancing the Soft & Hard theory proposed in this research, focusing on:

- a. **Developing an algorithm that encompasses the Soft & Hard score and Participation Spectrum** aiming to assess the level of participation of any social housing project, built or unbuilt. This system would also be able to provide insight during the design phase of the project, generating radar charts that would inform the level of performance of each variable of the project.
- b. **Investigating the feasibility of the application of Discrete into the Soft & Hard Framework.** As one of the contributions of this

research, the Framework was created to facilitate the collaboration between architects and users during all the phases of the social housing design, and ultimately promote more equality. Claypool (2019), suggested in her research⁵⁴ that Discrete could be a tool to achieve equality in social housing, because it sees building blocks as “open-ended, scalable, universal, and versatile” (pp.48). I believe that the connection of the two concepts can render an interesting contemporary response to the design of social housing projects.

- c. **Creating a comprehensive database of social housing projects with subcategories** that inform the elements of participation in their design, their participation spectrum, identifying how the frame adjusts on distinctive design solutions through formal analysis diagrams. This database can be interactive, such as the one developed by Awan, Schneider & Till (2011): *The Spatial Agency*⁵⁵

⁵⁴ In her article for Architectural Design, *Our Automated World* (2019), Mollie Claypool also emphasizes the need for a participatory design process, where the user would choose which “parts” would compose their house design. She also considers a shift in the architects’ role “towards that of a designer of a system, where the architect manages a conceptual and methodological framework for architectural production” (pp.50).

⁵⁵ For more information: see *The Spatial Agency* (<https://www.spatialagency.net>).

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