



World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium 2016,
WMCAUS 2016

Refurbishment in Large Housing Estates: a Review on Restructuring and Upgrade

Cèsar Díaz Gomez^{a,*}, Pere Joan Ravetllat Mira^b, Pilar Garcia Almirall^a,
Còssima Cornadó Bardón^a, Sara Vima Grau^a

^a*Dept. of Technology in Architecture, U. Politècnica de Catalunya-Barcelona Tech, Av. Diagonal 649, Barcelona, Spain*

^b*Dept. of Architectural Design, U. Politècnica de Catalunya-Barcelona Tech, Av. Diagonal 649, Barcelona, Spain*

Abstract

The current renovations and improvements taking place in housing stock, particularly in large residential buildings, provide a great opportunity for Spain and Europe to make a transition towards a more environmentally friendly housing that additionally contributes to improve the socio-economic condition of its inhabitants. Among the various issues that motivate the need of restructuring and repair, Large Housing Estates must face their adaptation to the current housing standards, maintenance and upkeep, adaptation to current energy efficiency goals and search of greater social integration mechanisms. In this framework, complex urban, spatial, technological and social topics cannot be addressed independently, and a broader multi-disciplinary approach in the research of mechanisms of contemporary upgrade is required. The present research aims to make a contribution to the state of the art on the very abundant casuistic that refers to tools and mechanisms that shape the diverse forms of intervention carried out in the last decades, as well as to analyze those that have proved to be particularly successful. With this purpose, an analytic procedure with a special focus on actions that addressed one or more scales of Large Housing Estates from both a technological and social point of view, aims to highlight patterns of intervention and their straight or indirect relationship with the achievement of certain goals.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of WMCAUS 2016

Keywords: urban restructuring, refurbishment, building upgrade, large housing estates, social integration;

The aim of this research, is to provide new analytic tools that can be applied in the future in order to shape models of action that

* Corresponding author. Tel.: + 34 93 4016389.

E-mail address: cesar.diaz@upc.edu

take into consideration all variables regarding Large Housing Estates renovation and upgrade in a holistic way including a multidisciplinary and multi scalar approach.

1. Introduction

Since the completion of their construction, Large Housing Estates have been object of urban and architectural debate and transformation. Indeed, nowadays European countries count with an abundant casuistic of interventions of renewal that have kept evolving over the past several decades. While in recent cases it is not yet possible to evaluate consequences, there is sufficient base to establish comparisons and detect common mechanisms that can be analyzed objectively. First of all, the current research establishes a chronological comparison between a wide range of actions carried out on selected study cases among European countries, with the aim of detecting patterns of intervention and current tendencies according to diverse political and contextual facts.

In addition, the research focuses on some study cases and provides analytic tools in order to establish objective criteria to define the relationship between particular forms of intervention and the achievement or consecution of goals in each scale of the architectural condition of urban residential groups, in order to detect strategic patterns of intervention.

2. Evolution of forms of intervention in Large Housing Estates in Europe

A wide range of European study cases have been analyzed with the aim to describe and classify them according to their specific mechanisms of intervention.



F1.1. Demolition	
F1.2. Puctual or programmed Substitution	

Fig. 1 Interventions of Demolition and Substitution






F2.1. Ordinary and extraordinary mantainance	
F2.2. Structural repair	
F2.3. Accessibility and energy efficiency upgrade	
F2.4. Functional and living conditions upgrade	
F2.5. Morphological modification	

Fig. 2 Interventions of Refurbishment of existing buildings.

F3.1. Housing	
F3.2. Non residential uses	

Fig. 3 Construction of new buildings.




F4.1. Maintenance and equipment	
F4.2. Structural transformations and renewal	
F4.3. Infrastructure	

Fig. 4 Interventions on the public space.

F5. Social programs

Fig. 5 Interventions that count with social programs.

Figures 6-9 illustrate the evolution and tendency in some European countries by means of a chronological scheme with a colour code that refers to each kind of upgrade action as described in Figures 1-5.

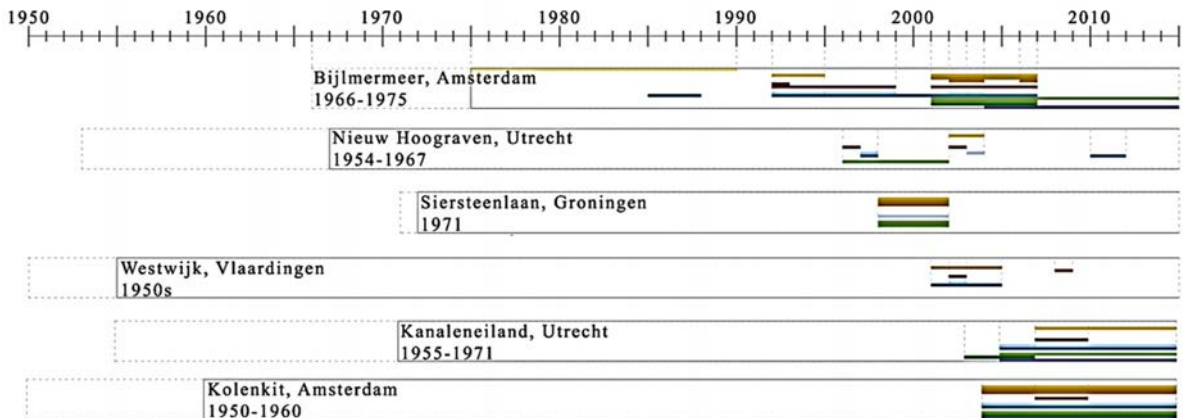


Fig. 6 Interventions on Large Housing Estates in the Netherlands [7, 8].

The strong interventionist tradition of the Netherlands policy regarding housing stock is related to the multi scalar and integral approach of most transformations of Housing Estates [7], [8]. Integral neighbourhood renewals do not only affect punctual building refurbishments but they also aim to transform the urban layout of the neighbourhood by means of demolition, refurbishment and new construction, with a special attention on the public space and social programs [9].

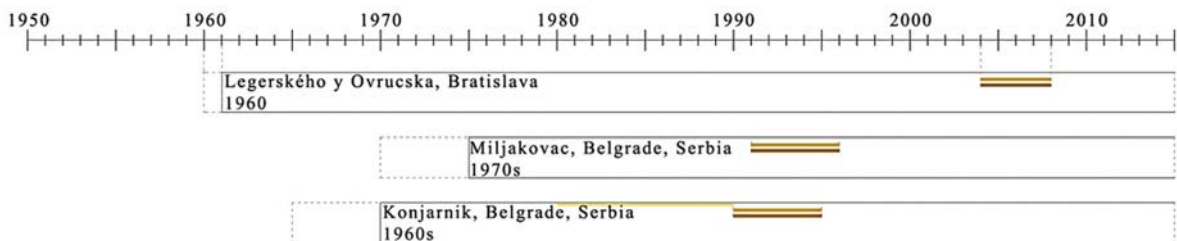


Fig. 7 Interventions on Large Housing Estates in Serbia and Slovakia [7].

The social composition of Large Housing Estates in post socialist eastern countries is significantly different given the fact that they represent 70% of the housing stock [7]. Thus, it is not strange that many interventions focus on the refurbishment of punctual aspects of existing buildings with no particular will for urban global transformation.

French cases signify an almost mimetic résumé of the global tendency in Europe. Early interventions of demolition in order to address peaks of social conflict have later proved, despite their media impact, unable to solve urban and social problems in a long term [6]. Preceded by early maintenance and equipment of Grands Ensembles, two lines of

action emerge in the last two decades: integral urban transformations and global building refurbishment practices. The second group is based on the growing debate on the enhance of Large Housing Estates' architectonic and urban characteristics that qualify them as architectonic heritage.

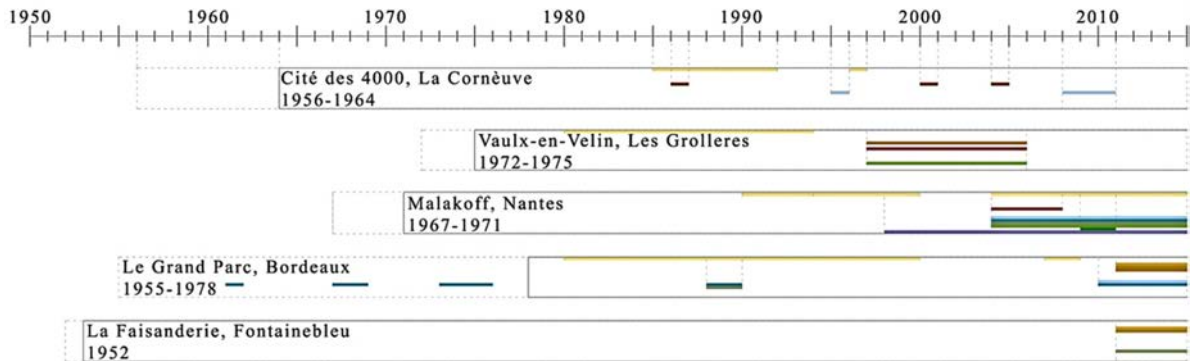


Fig. 8 Interventions on Large Housing Estates in France [6, 7].

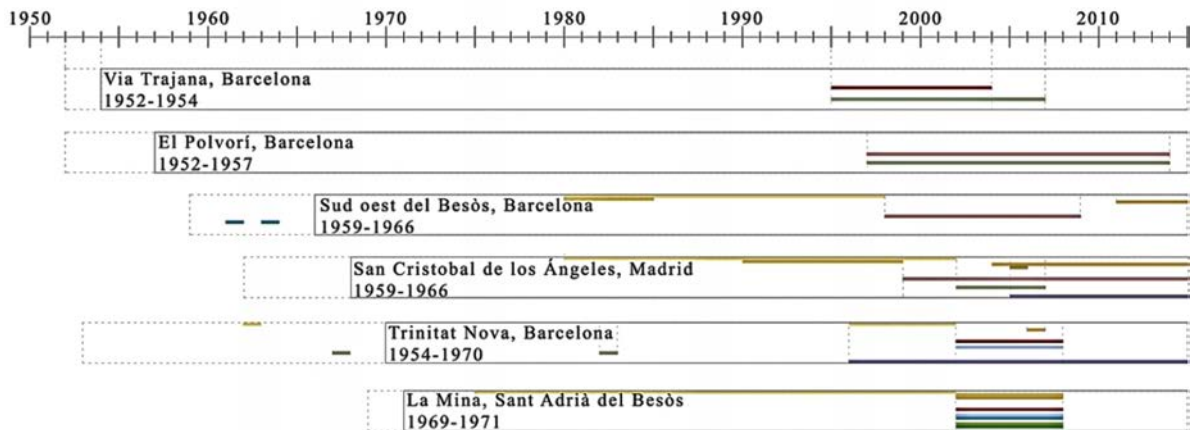


Fig. 9 Interventions on Large Housing Estates in Spain [2, 3, 5].

The evolution of interventions in Spanish cases is based on two particularities. First of all, there is a significant distinction of the built stock that was built at the early 50s (very bad constructive quality and extremely small dwelling surfaces). The corresponding interventions of programmed demolition and substitution of all buildings in the estates are linked, thus, with strong constructive and functional deficiencies [5]. On the other hand, Spanish housing stock presents the particularity of being mostly owned by its inhabitants. The consequent fragmentation of property, together with the usual economic difficulties within these especially vulnerable neighbourhoods are strong barriers when addressing integral urban transformations of Large Housing Estates in Spain.

3. Analysis of specific forms of architectural intervention according to scalar approach

This research has developed a graphic tool that illustrates the relationship between specific forms of intervention (Table 2) and the achievement of certain goals (Table 1) according to the three scales that define residential neighbourhoods: urban, building and dwelling. By means of a graphic representation of the achievement of certain

goals in different scales, it is possible to evaluate the impact of specific forms of intervention, as well as to have a full picture of the global impact of an intervention. Global and integral transformations count with a wide number of goals achieved at all scales. In parallel, strategic forms of intervention relate to several goals in more than one scale. Thus, the number of interactions among the three different scales is a tool to evaluate objectively the scope of the intervention.

Table 1. Goals of the intervention Le Grand Parc, Bordeaux [1, 4].

URBAN SCALE	
A1. Connectivity with the city	■
A2. Energy efficiency (district)	
A3. Connectivity within the neighbourhood	
A4. Public space	
A4.1. Equipment	■
A4.2. Accessibility	
A4.3. Visual impact	■
A5. Functional upgrade	
A5.1. Density	■
A5.2. Diversity of uses	■
A5.3. Diversity of typologies	■
BUILDING SCALE	
B1. Security	
B2. Accessibility	■
B3. Energy efficiency (building)	■
B4. Functional upgrade	
B4.1. Number of dwellings	■
B4.2. Diversity of uses	
B4.3. Access and circulations	■
B4.4. Common spaces	
DWELLING SCALE	
C1. Functional upgrade (typology)	■
C2. Confort and living conditions upgrade	■

Table 2. Specific forms of architectural intervention, Le Grand Parc, Bordeaux, [1, 4].

URBAN SCALE	
X1. Mobility infrastructure	
X2. District service infrastructure	
X3. Street structure modification	■
X4. Public space	
X4.1. Change of morphology	■
X4.2. Furniture renewal	■
X4.3. Suppression of architectural barriers	
X4.4. Greenery and landscape	■
X5. Building stock	
X5.1. Demolition	
X5.2. Refurbishment (Y)	■
X5.3. New construction	■
BUILDING SCALE	
Y1. Security	
Y1.1. Structure	
Y1.2. Use	
Y1.3. Fire	
Y2. Accessibility	
Y2.1. Vertical connexions	■
Y2.2. Horizontal connexions	
Y2.3. Suppression of architectural barriers	■
Y3. Building skin	
Y3.1. Volume modifications	■
Y3.2. Energy efficiency	■
Y3.3. Renewal of external finishes	
Y4. Service infrastructure	
Y4.1. Renewal	
Y4.2. Sustainable energy systems	
Y5. Units of use	
Y5.1. Addition of buildings	
Y5.2. Addition of rooftop units	
Y5.3. Addition of ground floor units	
Y5.4. Demolition of building parts	
Y5.5. Demolition of floors	
Y5.6. Demolition of ground floors	■
Y6. Common spaces	
Y6.1. Access modification	■
Y6.2. Circulation surface modification	■
Y6.3. Rooftop spaces	
Y6.4. Common spaces between floors	
Y7. Dwellings (Z)	■
DWELLING SCALE	
Z1. Interior surface modification	■
Z2. Incorporation of exterior spaces	■
Z3. Interior redistribution	■
Z4. Interior renewal of dwelling pieces	■

4. Conclusions

The observed tendency in the European framework regarding transformation of Large Housing Estates is dual. On the one hand, practices of integral transformation have extended widely in the past two decades.

These type of transformations are rooted on the urban and city scale and incorporate upgrade actions of the public space and social programs, while also attending transformations on the building and dwelling scales.

On the other hand, there is a tendency towards global refurbishment at building and dwelling scales, consisting of architectural interventions that transcend punctual technical aspects and attain the functional behaviour of the building and dwellings, while keeping the urban morphology of the neighbourhood. The urban transformation of Bijlmermeer in Amsterdam and the interventions in Le Grand Parc in Bordeaux are good examples of these dual contemporary tendency.

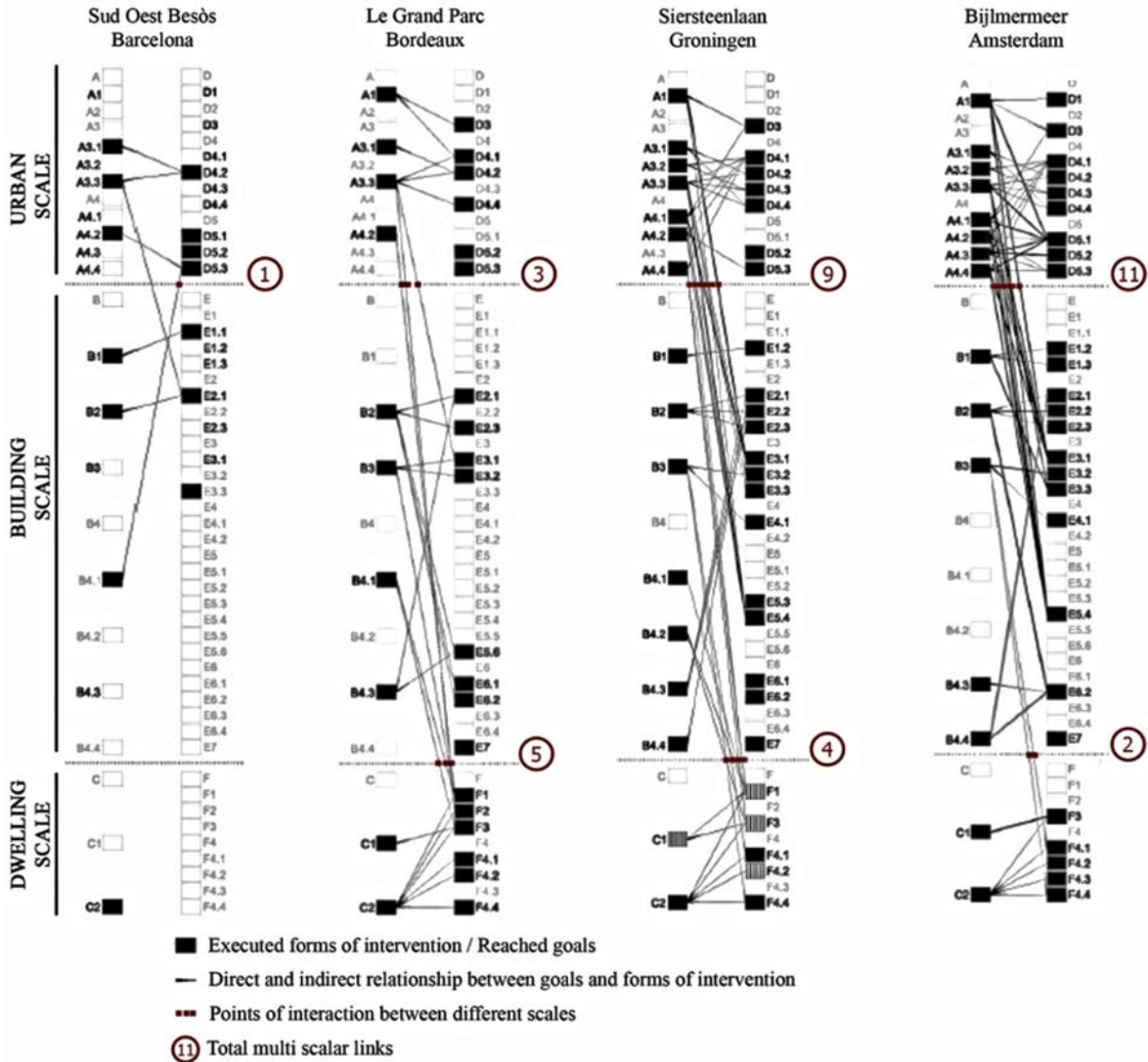


Fig. 10 Relationship between specific forms of architectural intervention and achieved goals [4, 5, 7, 9].

The specific analysis of case studies leads to the conclusion that a global neighbourhood upgrade can not only be achieved by means of large scale urban and architectonic transformations. Indeed, refurbishment practices on a local scale on buildings or even dwellings, if applied strategically and in a systematic way, have the potential to achieve far-reaching transformation. This fact is relevant in order to raise awareness of the potential scope of local interventions that are too often approached only from a punctual perspective, regardless of their possibility to attend goals on a broader scale.

References

- [1] Almeida, M., Hadjimichael, G., Melgaard, E., Verhoef, L.G.W. *Cost C16 Improving the Quality of Existing Urban Building Envelopes: needs*. IOS Press BV, 2007.
- [2] de Luxán, M., Gómez, G., 2006. Dos bloques de viviendas y locales comerciales en San Cristobal de los Ángeles, Madrid. *Informes de la Construcción*, 58, pp.5–16.
- [3] Díaz C., Cornadó, C., Llorens, I., Pardo, F., and Hormías, E. “Un estudio de caso: la rehabilitación de los edificios de viviendas del barrio de La Mina en Sant Adrià del Besòs (Barcelona).” *Inf. la Construcción*, vol. 64, no. 525, pp. 19–34, Mar. 2012.
- [4] Druot, F., Lacaton, A., Vassal, J., 2007. *Plus*. Barcelona: Editorial Gustavo Gili.
- [5] Institut Català del Sòl (2006): *Reviure els barris: programas de nuevas viviendas de sustitución para la mejora de las áreas urbanas de Cataluña*. Generalitat de Catalunya. Dep. Política Territorial i Obres Públiques.
- [6] Lelévrier C., 2008. *Mobilités et trajectoires résidentielles des ménages relogés lors d’opérations de renouvellement urbain. Synthèse des travaux menés entre 2004 et 2007*. Rapport PUCA-DIV-DREIF.
- [7] van Kempen, R., Dekker, K. Hall, S., Tosics, I. *Restructuring large housing Estates in Europe*. The Policy Press, 2005.
- [8] van Beckhoven, E. *Decline and Regeneration. Policy responses to processes of change in post-WWII urban neighbourhoods*. Nederlandse Geografische Studies, 2006.
- [9] Wassenberg, F., 2011. *Demolition in the Bijlmermeer: lessons from transforming a large housing estate*. *Building Research & Information*, 39(4), pp.363–379.