

RESEARCH ARTICLE

# Mat-hybrid housing: Two case studies in Terni and London



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## KEYWORDS

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Low-rise high-density;  
Cooperative housing;  
Mat-building;  
Hybrid housing;  
Participative architecture

## Abstract

This study focuses on the spatial and mutable characteristics of the “mat-hybrid housing” (MHH), a specific type of public housing. Analyses were conducted specifically on the period between 1960 and 1980 and two particular case studies, namely, Nuovo Villaggio Matteotti in Terni, Italy, and Odhams Walk in London. The qualitative research design of this study is based on the methodology called AIFAD (an abbreviation for Archives, Interviews, Fieldwork, Analytic diagrams, and Drawings). The goal of this paper is to identify, define, and extract possible strategies for implementing MHH, which can improve urban growth through compact schemes. These objectives can be achieved by adopting the schemes in such manner as suburban sprawl is prevented, the densities of existing cities are intensified, the possibility of changing the concept of domestic space is tested, and the identity, history, and tenant participation in each city is strengthened. Through this approach, the MHH can be effected.

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## 1. Introduction

One of the first European company towns identified by the presence of workers’ housing was built in Belgium in 1838. Its name is Bois-du-Luc (UNESCO, 2012), and it represents an example of utopian architecture. However, the historical compact courtyard known as “beguine” or “béguinage,” an area declared as a world heritage site by the UNESCO in

Belgium, introduced the very first pioneering “co-housing” way of living or “workers’ houses”; it was created during the medieval times in the thirteenth century and occupied only by women (UNESCO, 1998). In England, 15 cooperative housekeeping projects were operated from 1874 to 1925. This cooperative movement developed the concept of several households composed of one or more people sharing the labor and cost for services, such as laundry, cleaning, and cooking (Pearson, 1988). This concept could also be found in Owen’s utopia and his “Quadrilatero,” Fourier’s phalanstère, and Melusina Fay Pierce’s “cooperative housekeeping” (Hayden, 1981), or in Morris’s theories (Vestbro and Horelli, 2012).

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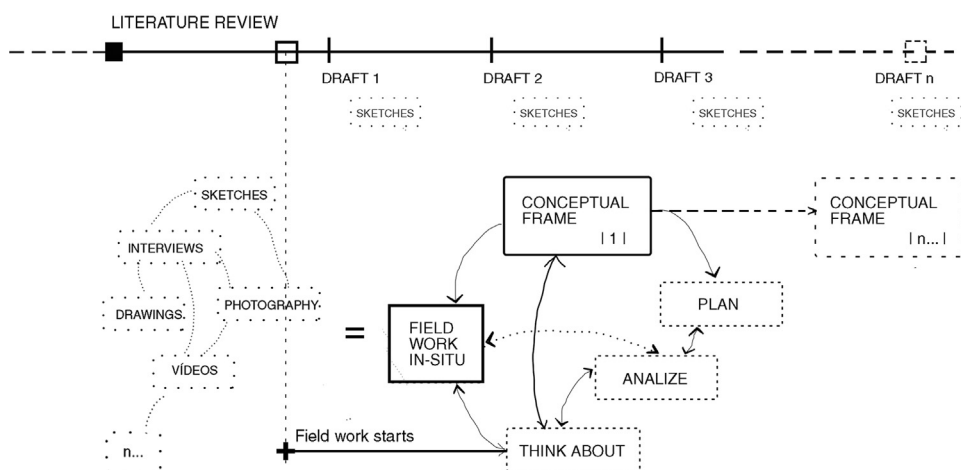
Austria and Soviet Russia were among the first countries that developed “workers’ houses” (Harris, 1999). Around 1870 for example, Austria’s capital “Red Vienna” (Blau, 1999; Harris, 1999) was characterized by nonprofit housing organizations (Lang and Novy, 2014). Furthermore, Scandinavia was also influenced by utopian approaches, such as Thomas More’s (More, 2016), Fourier’s, and Godin’s (Vestbro and Horelli, 2012) ideal societies, that presented an alternative manner of collaborative housing and common living called co-housing, in which facilities and communal spaces are shared. The Scandinavian example represents a precursor of future housing projects, from a gender-based perspective, because multi-family buildings at present are owned and operated cooperatively. However, one of the first approaches to co-housing in London was established in 2014 in Copper Lane, Islington (Henley and Hale-Brown, 2014).

In 1929, the International Congress of Modern Architecture, which was spearheaded by Ernst May, focused on topics related to workers’ houses under the idea of “Existenzminimum.” In response to this Congress, Karel Teige wrote in 1931 *The Minimum Dwelling* which defined a dwelling as a “minimum individual cell” (Teige, 2002) within housing spaces related to domestic labor and those of common use. In 1950, the genetics expert Barbara McClintock introduced the concept of “hybrid” in her research entitled “Locci in maize” (McClintock, 1950). This concept was applied to architecture as early as the Medieval Period as reflected in the livable bridges in Europe. In Fenton’s contemporary work on nineteenth-century American architecture (Fenton, 1985), the concept of “hybrid buildings” was basically translated to hotels, offices, and sports clubs, which demonstrate an alternative and innovative distribution of the space through mixed-use functions. However, an important example of the hybrid housing as a “typological approach” is the habitable bridge Ponte Vecchio, which was constructed in 1345 in Florence, Italy. This bridge is considered a main reference point in this research to understand the “system” concept of domestic infrastructure as a permanent structure and as a variable residential and commercial mixed-use structure. The concept of “hybrid” is also used to refer to low-rise high-density housing (Fernández-Per, 2009). This concept is the conceptual basis of this research.

## 2. Research design and methodology

This research uses a case study methodology based on a comparative approach and Grounded Theory (Glasser and Strauss, 1967; Charmaz, 2005). The data are analyzed, collected, and recycled, allowing an iterative process between data collection and analysis through a constant comparative process (Fig. 1).

Two case studies have been selected from a database of 100 projects. This paper presents both comparative case studies to present an in-depth analysis of two buildings. Both buildings were constructed in the same decade, adopted comparable project-strategies approaches, and public housing. Their similarities allow for good comparison. They were compared using the methodology called AIFAD (an abbreviation for Archives, Interviews, Fieldwork, Analytic diagrams, and Drawings) (Table 1), focusing on visual art-based techniques (Bagnoli, 2009) and image-based research (Prosser, 2008). Accordingly, this research employs archive consulting, face-to-face semistructured interviews, fieldwork, analytic diagrams, and drawings. In the first phase, original archives were consulted, the related literature was reviewed, and related information from universities or city council archives were compiled. The literature review (Figs. 2 and 7) was conducted at the early stage to collect data on related subjects published in the United Kingdom (UK) and Italy. The interviews were useful to measure how tenants live and how the buildings perform in terms of providing livable space; the results of these interviews were used for the qualitative analysis in this study. The fieldwork was conducted from July 2017 to December 2017. Fieldwork is essential because it allows for on-site analysis through the examination of the actual conditions of the structures. Furthermore, fieldwork has been proven essential in the study of the evolution of buildings in terms of materiality, time, adaptation to the context, and perceived and tangible changes related to tenant use. The analytic diagrams (Lynch, 1960) provide the primary basis for understanding the buildings through a “fast but accurate line drawing” (Figs. 11, 14, 15). Finally, two- and three-dimensional drawings, such as perspectives (Fig. 6), sections (Figs. 4, 5, and 9), plans (Figs. 3, 12 and 15), collage drawings



**Figure 1** Main resources used to obtain the information collected and the subsequent analysis of projects. Source: own elaboration.

Table 1 AIFAD methodology phases (archive consulting, interviews, fieldwork, analytic diagrams, and drawings). Source: Own elaboration.

Phases	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Description	Literature review and archive consulting.	Face-to-face semi-structured in-depth interviews	Field work	Analytic diagrams (Lynch, 1960)	Drawings
Length	2015 to January 2018	May and October 2017	May and October 2017	May 2017 to January 2018	May 2017 to May 2018
Villaggio Matteotti, (Terni, Italy.)	Archive IUAV (Università di Architettura di Venezia)	n = 10 Tenants	Photography Videos Drawings (F5)	Building process (F10 and 13) Dwelling typologies (F15, 12) Space-syntax analysis (F11 and 12) Network map (F2 and 7)	Cross section and context (F4, 5 and 9)
Odhams Walk, (London, UK.)	LMA (London Metropolitan Archives, 2017) WCCA (Westminster City Council Archive, 2017)	n = 5 Tenants and TMO Building manager			Floor plans (F3, 12)

F = Figure, n = number.

(Fig. 6), and axonometric (Fig. 8) and volumetric drawings (Fig. 13) were used to measure the proportion and the scale of the buildings in their context.

### 3. Case studies and literature review

#### 3.1. Case study 1: Villaggio Matteotti in Terni, Italy

Nuovo Villaggio Matteotti is a neighborhood located in Terni, which is a town situated 100 km from Rome and in the heart of Italy. The economic life in the city was anchored on the establishment of the Società degli altiforni, fonderie e acciaierie di Terni, which is a steel company. The “new Villaggio” was developed between 1964 and 1972 by Giancarlo De Carlo, Valeria Fossati-Bellani, and Fausto Colombo, with the sociologist Domenico De Masi (Fig. 2).

The neighborhood has 250 dwellings, although it was originally conceived for 800 employees with their families, totaling 3000 people (Marini, 2015). The 5 different dwelling typologies accommodate 45 domestic variations (Fig. 3). De Carlo (1970) said,

The growth and flexibility of an architectural organism are not really possible except in a new conception of architectural quality. And this new conception cannot be formulated except by means of a more attentive exploration of those phenomena of creative participation which are labeled “disorder” (p. 13).

The construction system of the building is based on the Italian brutalism architecture characterized by concrete load-bearing walls because it has “three streets in the sky” connecting the common spaces and the facilities in the Villaggio. These “livable zigzag lines” are the connecting street between the shared closed spaces and the perimeter street around the neighborhood. (Fig. 4)

At the core of the project are two concepts. The first concept is the accuracy of the architectural design. Villaggio Matteotti is a system composed of five elements: (1) streets in the sky; (2) hanging gardens; (3) building “typology” as an intermediate between block and “fragment,” which allows a common atmosphere at the urban scale from the macroscale to the meso- and microscales (Greed, 1997); (4) separation of pedestrian from cars to allow a pleasant daily life and provide common spaces; (5) meeting places to share with neighbors (Fig. 5A and B). The second concept is “architecture and participation,” which Giancarlo de Carlo termed *il pubblico dell’architettura* in 1970. This concept enounces the difference between “planning for” or “order” and “planning with” or “disorder” (De Carlo, 1970, 1972), in which planning is a repressive and an authoritarian act whereas planning is a democratic and liberating act. De Carlo (1988, 2018) said,

I think that participation is a complex process, which requires imagination and courage, projecting with deep transformations of the very substance of architecture. The aim is to achieve a multiple language able to adapt to changing circumstances, to the consumption of time that passes, to various levels of knowledge and perception, to the plural expectations of many possible interlocutors; a language composed of many equally significant strata.

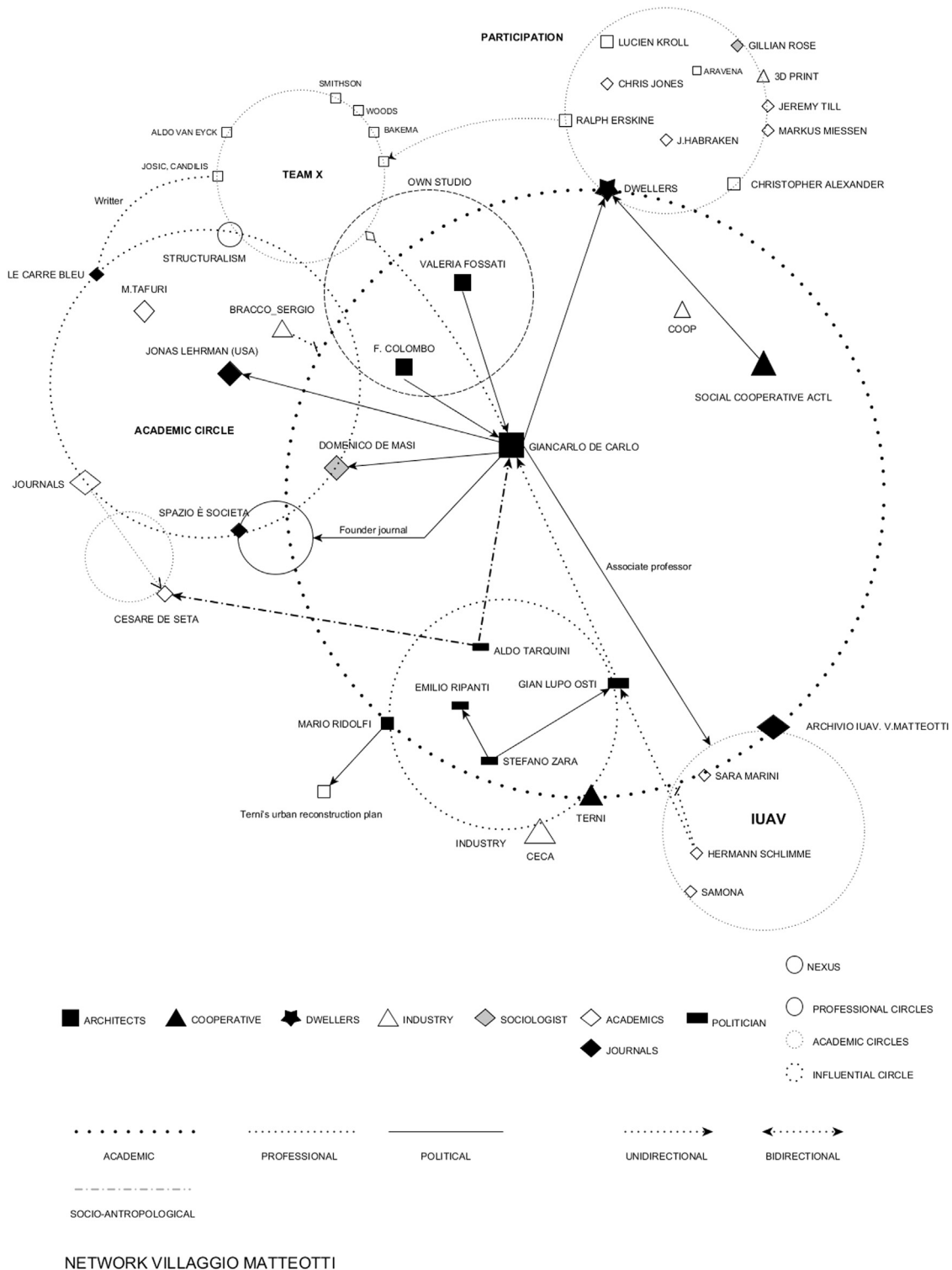
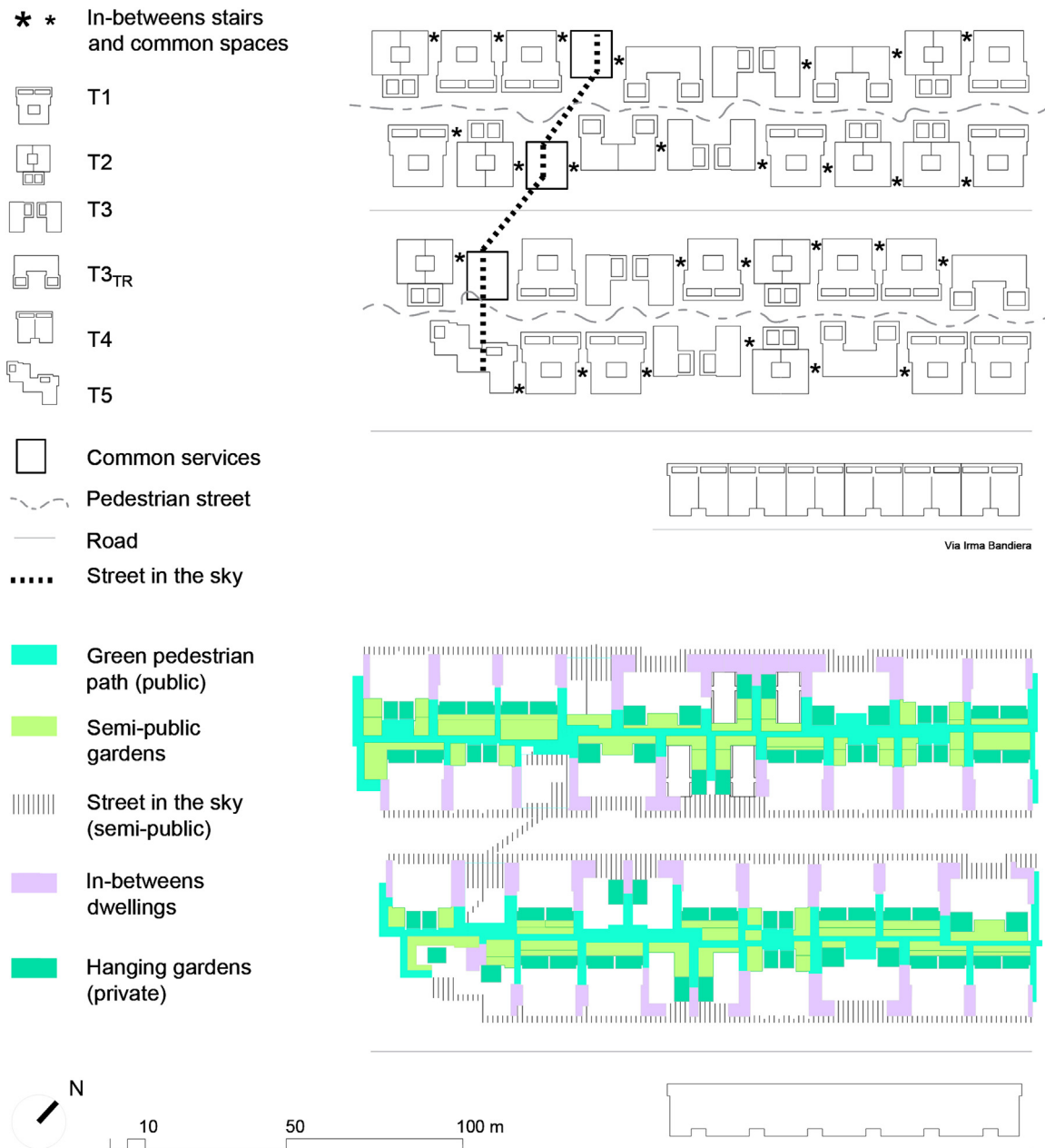


Figure 2 Literature review (phase 1) and network agents (phases 2 and 3) in the participative process. Source: Own elaboration from fieldwork, research references and IUAV archive consult.

### 3.2. Case study 2: Odhams Walk in London

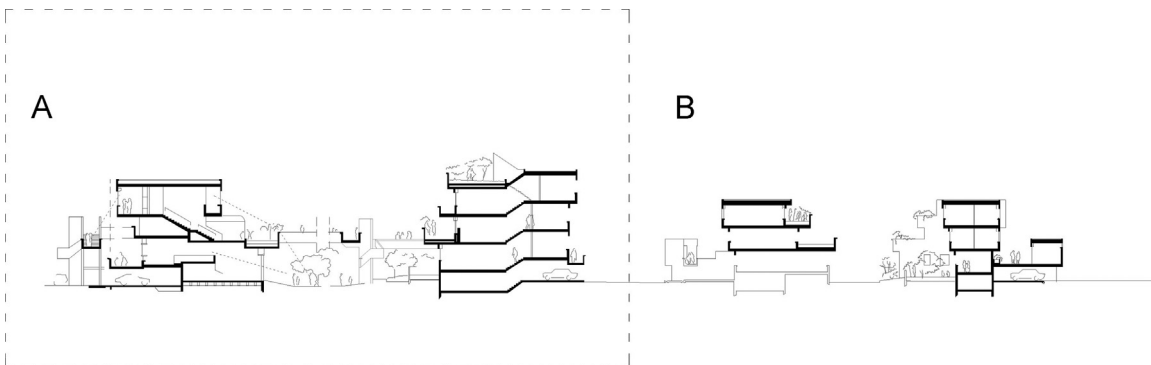
Odhams Walk is a human-scale neighborhood in Central London (Fig. 6), in the very heart of Covent Garden (Richardson, 1979). It has the distinction of being the last

of Britain's public housing projects applying the high-density low-rise scheme (Smith, 1982). It was designed by Greater London Council (GLC) under the direction of Architect to the Council Sir Rogers Walters and Housing Architect Gordon Wigglesworth, with the support of architects Donald Ball,



**Figure 3** Diagram of Villaggio Matteotti. Top: Its 5 different typologies and 45 variations. Bottom: Intermediate spaces gradients and hanging gardens.

Source: Own elaboration from fieldwork in Terni and IUAV archive consult.



**Figure 4** Transverse section of Villaggio Matteotti. The square shows Fig. 4A, whereas the nonsquare part is Fig. 4B.

Source: Own elaboration from fieldwork in Terni and IUAV archive consult..



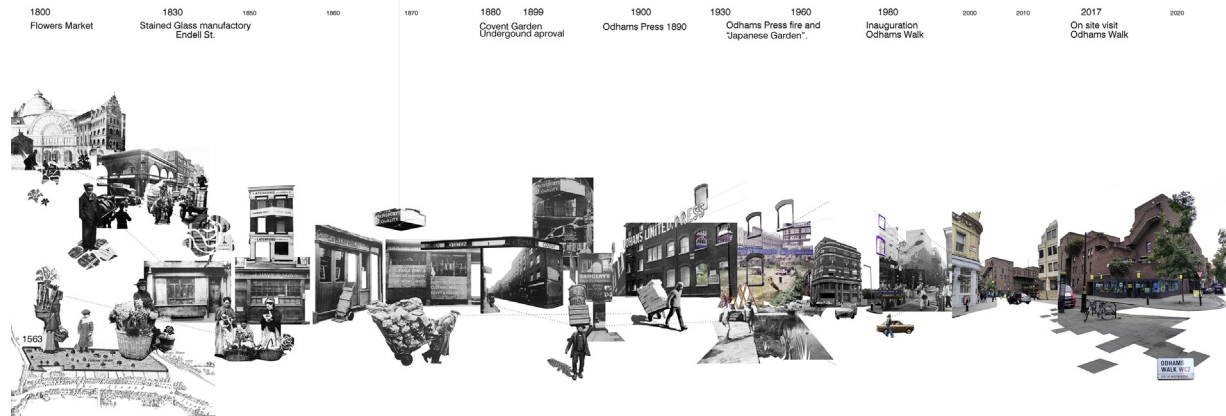
**Figure 5** A. Zoomed in section focusing on the “streets in the sky” and the interior zigzag distribution of common cultural spaces and dwelling type 1. Source: Own elaboration. B. Zoomed in section focusing on the “streets in the sky” and the interior distribution of dwelling types 2 and 3. Own elaboration from fieldwork, on-site interviews in Terni and IUAV Archive consult in Venice.

Steven Groak, John Watts, and Matt O’Connor. Fig. 7 shows the interconnections and relationships involved in the project development. Several key figures are involved in the construction process. One of them is Gladys Dimson, who was elected in 1964 to GLC as part of the Labor Party, became a key figure in the Odhams Walk development. Fig. 7 shows the three important circles (politics, academia, and tenant participation) represented.

This hybrid building was partially inspired by the Kasbah and the Mediterranean towns (Rudofsky, 1964). Facilities, shops, and gyms, which are located on its compact ground floor-basement, account for 40% of the building. It also has a social center for the tenants and a day care center for the elderly; both are shared facilities. The original plans of the

Westminster City Council show that the building should provide a primary school, domestic workshops, medical center, community center, a recreation center, public house, shops, restaurants, and cafés, 60 dwellings units, 40 old people’s housing units, and a public open space.

At the lower level, the building has provision for a total of 4857 m<sup>2</sup> of nonresidential space available for rent, as mentioned. In addition, 1052 m<sup>2</sup> space in the deep basement is available for sports facilities. It adopts a high-density low-rise scheme in 0.66 ha (Fig. 8). The new building is designed such that the old existing basement of Odhams Press (Endell Street side) is used. The building has 102 dwellings: 60 for two persons, 21 for four people, 13 for five people, and 8 for six people. Each group of dwellings has its



**Figure 6** Covent Garden development from the old flowers market until the present (2018) in Endell Street.

Source: Own elaboration on-site interviews and fieldwork.

own access to the staircases which are connected to the third floor (Westminster City Council Archive [WCCA]).

Although the original project was conceived to have eight access ways from the street to the interior patio, the access ways to the present building have been reduced by the tenants to only two. In an interview, the building manager explained, “It used to be an open plan, it was too much fluid. It had eight accesses (Fig. 8). However, neighbors decided to close six out of eight gates from the building for security problems.”

The structure is based on a concrete frame with hollow-pot floor slabs. The bricks are a multicolored stock. The structure faces Crowborough (Fig. 9). The roof insulation is provided by an “inverted roof.” The dwellings are heated by individual and centralized gas-fired boilers with central metering (WCCA).

“Two notable results are the amount of privacy of individual flats, and the provision of a good-sized private external area at upper levels for communal use.... This is achieved by imaginative arrangements of units consisting of a two-person rectangular flat over an L-shaped family flat.” (The Brick Bulletin, 1983)

As part of the fieldwork, several interviews were conducted inside the building. One of the most important interviews was the one with the building manager. She explained how the internal organization and Tenant Management Organization (TMO) play fundamental roles in Odhams Walk. The TMO interviews future tenants to know their “real” relationship with the area before they start to live there. The building manager explained that this method is used because the building is also a “community and not only a residential building.” Thus, the TMO looks for a long-term relationship with the people who want to settle in the building. She also emphasized the importance of establishing the appropriate mix of people with different ages and jobs to create a “respectable atmosphere” and a “sense of community.” She also explained the origin of the estate before Margaret Thatcher’s “Right-to-buy” law (Minton et al., 2016), which subsequently generated a mix of 60% council housing, 40% privately owned, and 20% originally bought (acquired the property for the first time).

## 4. Results and discussion of the comparative analyses

The comparative analyses focused on three groups of concepts, as shown in Fig. 10: densities, particularly low-rise high-density (LRHD) housing and mat-hybrid housing (MHH) (Section 4.1); distribution, particularly L-shape and the streets in the sky (Section 4.2), and ecological approach, particularly the hanging gardens and the intermediate spaces.

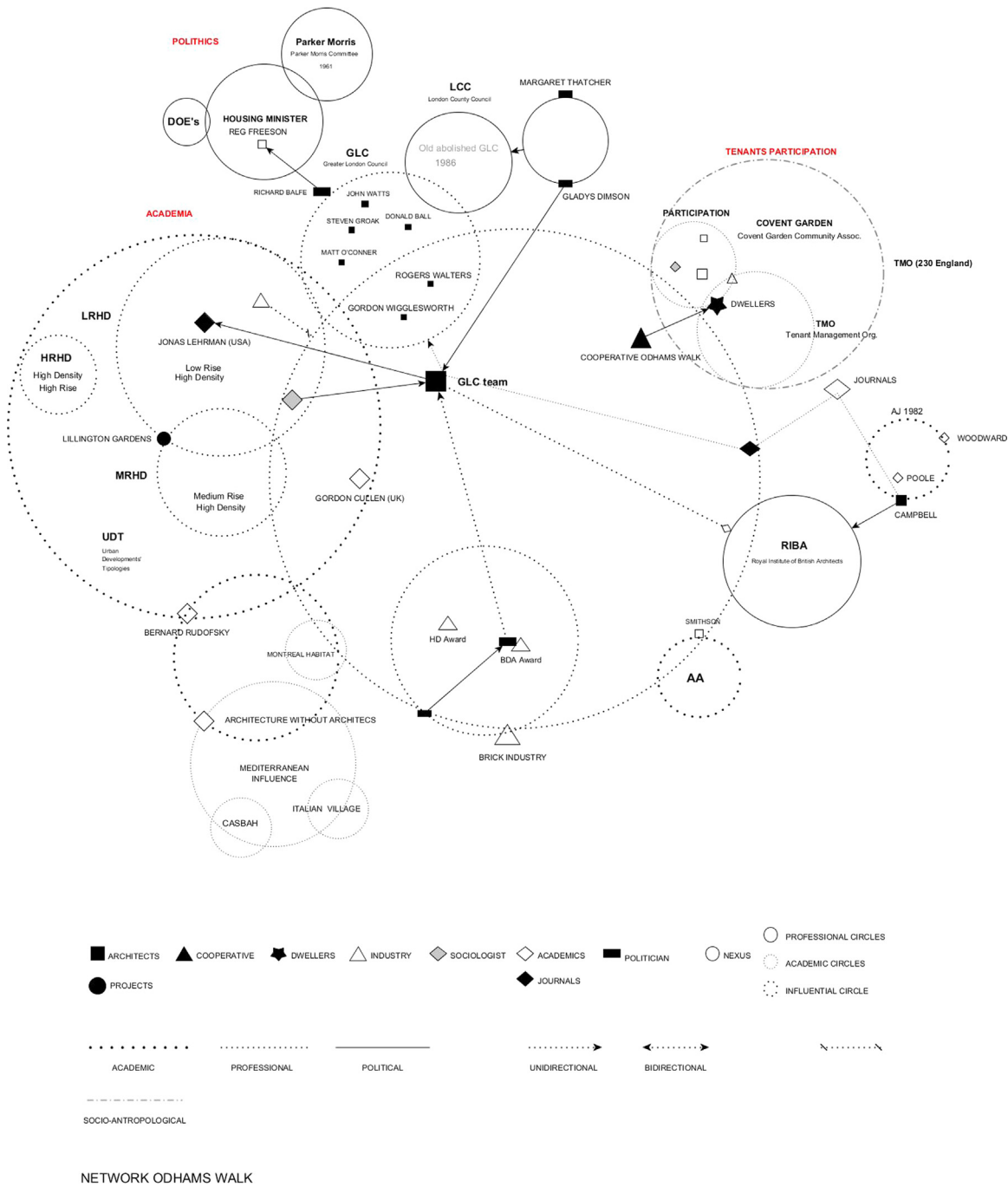
### 4.1. Densities: Low-rise high-density housing and mat-hybrid housing

The Museum of Modern Art (MOMA) in New York organized an exposition curated by Kenneth Frampton to provide a review of some American case studies of LRHD (low-rise high-density) approach (Frampton, 1973). The LRHD principle in housing has also been analyzed by other researchers. For example, Lehrman (1966) conducted a quantitative and qualitative study of how to solve the housing problem related to a rapid city’s growth. He analyzed 50 different case studies measured in dph (dwelling per hectare) to determine a high-quality level of living. This research served as a reference for the Villaggio Matteotti project (De Carlo, 1972), which allows a sustainable community with its linear and rich system of housing and streets in the sky.

Both Odhams Walk and Villaggio Matteotti are LRHD courtyard houses and MHH prototypes as both housing projects take advantage of several characteristics in different gradients and scales (Koolhaas and Mau, 1998). The prefix “mat-” comes from the fact that both projects are developed in accordance with the urban, compact heart-beat. As Smithson (1974) defined “mat-building as follows:

The mat-building is where the functions come to enrich the fabric and the individual gains new freedom of actions through a new and shuffled order, based on interconnections, close-knit patterns of association, and possibilities for growth, diminution and change.

Both are compact-scheme projects, connecting urban hatches and carrying hybrid processes in relation to their



**Figure 7** Literature review (phase 1) and network agents (phases 2 and 3) in the participative process. Source: Own elaboration from fieldwork, research references, LMA, WCCA and AA archive consult..

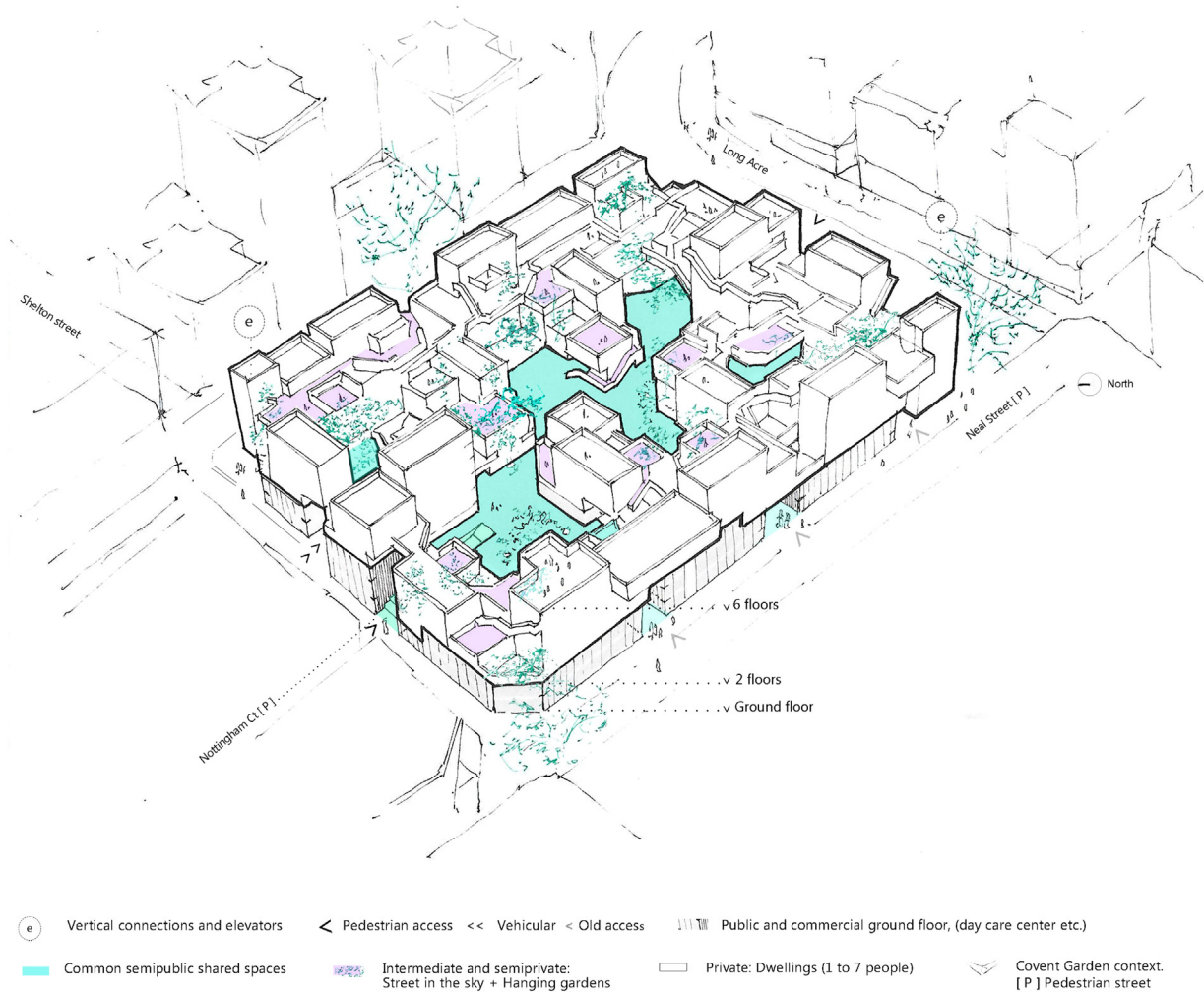
urban and environmental contexts (Fernández-Per, 2009), thereby compacting the existing city.

The root word “hybrid” is used to denote that the projects also adopt a multi-use scheme (Laplan, 1985), combining residential use with common-shared spaces and a continuous public-intermediate-private relationship through the presence of commercial estates, shops, and restaurants on the ground floor that constitute a sufficient percentage to maintain the building life rhythm in the urban context, in which each project has developed. This characteristic also allows MHH projects to meet the needs in the

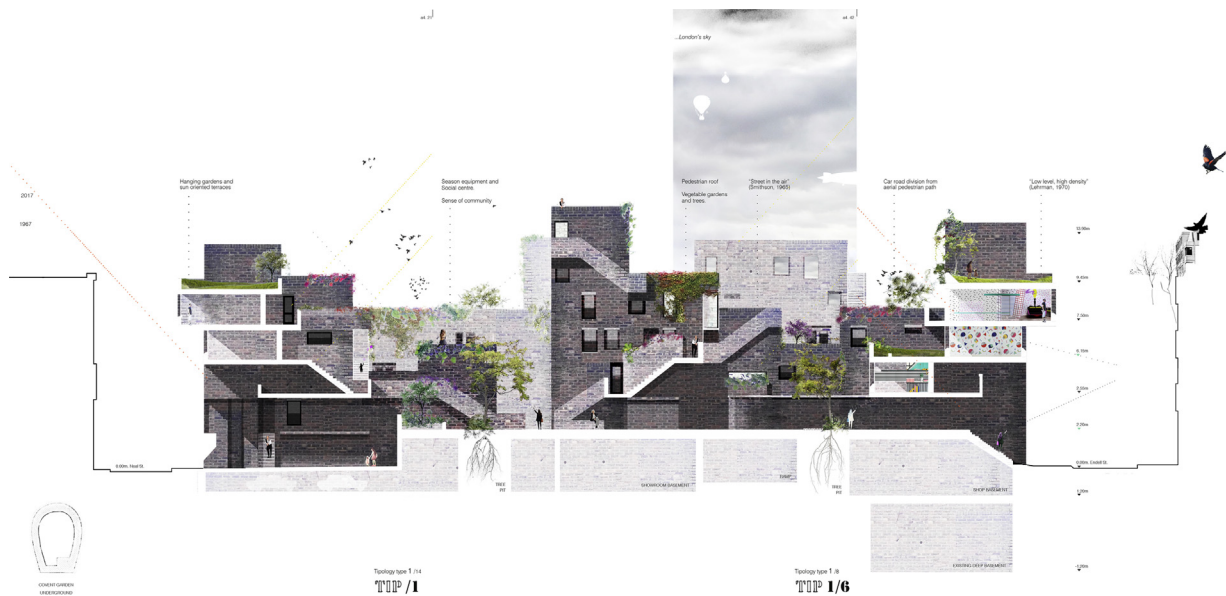
intermediate, private, and public spheres as well as serve an infinite variety of lifestyles. MHH projects are like an architectural “bestiary” (Borges and Guerrero, 1957) in which the possibilities are adapted to a new *modus vivendi* and alternative heterogeneous modes of living, which are directly related to the distribution of space.

In terms of density and ability to create more livable cities (Newman and Kenworthy, 1989), Odhams Walk and Villaggio Matteotti represent a compact mat-hybrid building, but the latter follows a nearly linear system distribution over the territory with the mixed-use of a zigzag

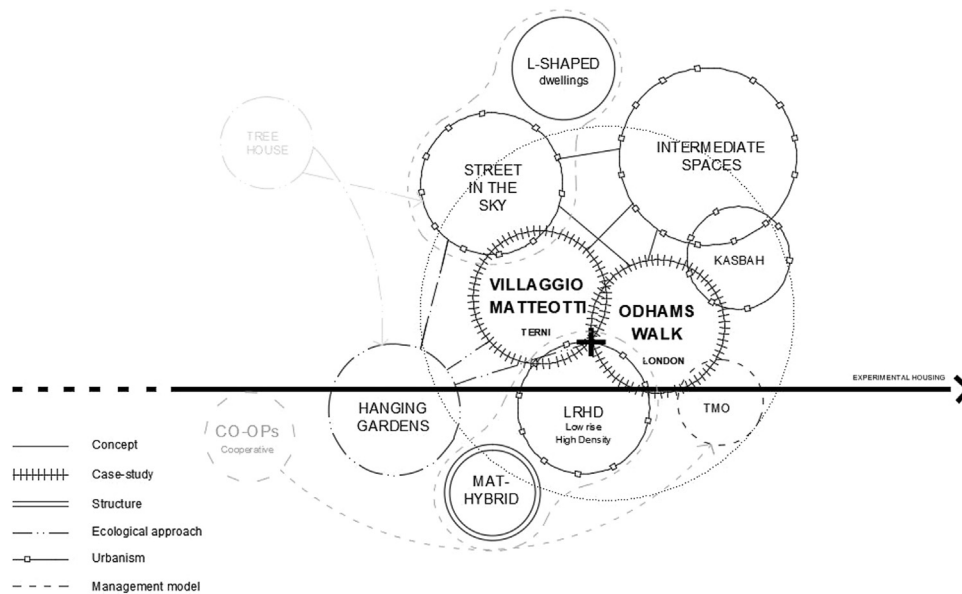




**Figure 8** Axonometric drawing of Odhams Walk.  
 Source: Own elaboration from on-site visits, WCCA consult and Google Earth.



**Figure 9** Transverse section showing the interior hanging gardens and dynamics.  
 Source: Own elaboration from fieldwork and WCCA consult.



**Figure 10** Concept diagram: densities, spatial distribution, and ecological approach.

Source: Own elaboration.

architectural promenade (*Le Stelle*) of the streets in the sky (Fig. 8). Odhams Walk has a density of 472 persons per hectare, and 43% of the building space is not for residential use, whereas in the original concept of Villaggio Matteotti, the nonresidential facilities correspond to and are connected to three specific points via *Le Stelle*.

#### 4.2. Distribution: L-shape and streets in the sky

In the 60s, Alison Smithson and Peter Smithson developed Robin Hood Gardens in East London as an attempt to realize the “streets in the sky” in the Mediterranean towns in Southern Europe (Smithson, 1993). They learned about the streets in the sky in the International Laboratory of Architecture and Urban Design founded by Giancarlo De Carlo in 1976. All three of them were members of the Team X, which came after the 9th CIAM.

However, the “streets in the sky” or the passages defined as “the corridors as devices for removing traffic from rooms” (Evans, 1996) can affect a tenant’s life both negatively and positively. For example, this corridor does not work in terms of human relationships (De Jorge-Huertas, 2017) in Le Corbusier’s *Unite d’habitation*. There, the connection with the space is not established, where you feel lost in a continuous line without guides. In *Utopia on Trial* (Coleman, 1985), Alice Coleman analyzed housing blocks in London, focusing on the corridor; she pointed out that this linear space was disorienting instead of serving as a guide in some cases. However the analyzed case studies, the corridors of Odhams Walk and Villaggio Matteotti, are masterfully designed. Their respective corridors function as a guide, a promenade, a complex, and a pleasant street for tenants, according to the tenants who were interviewed (Table 1).

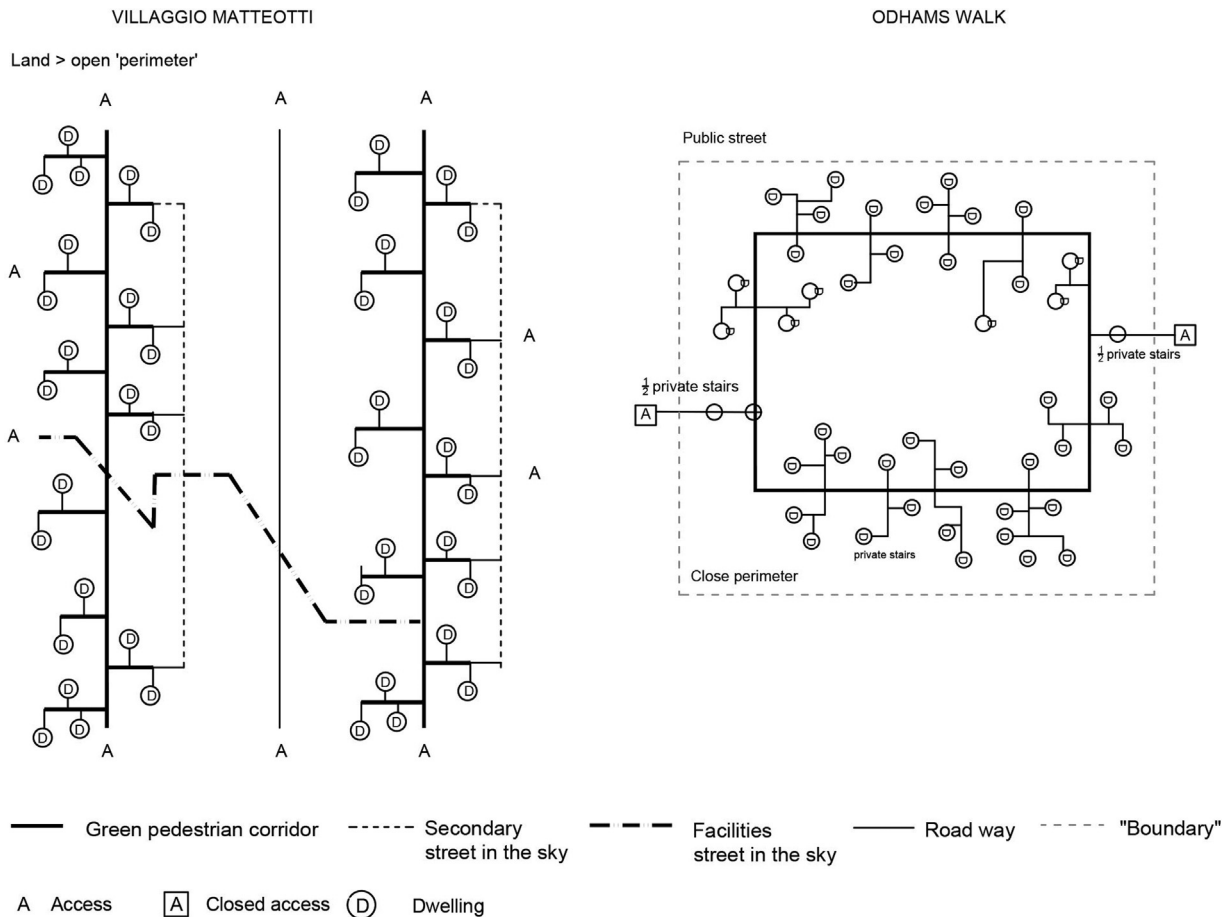
The morphologies of both projects have been planned so as to “maintain the privacy” of each dwelling by rotating the L-shaped unit (Figs. 8 and 12). The duplex “heads” are

arranged in stacks or in every four houses to maintain an atmosphere of privacy between houses, generating a visual dynamism, a “visual interest” (Lehrman, 1966). This factor is important because the people living in both housing projects work with one another; thus, no ghetto is created because both were built to be populated by a group of coworkers, namely, those working in the steel company in Terni and those working in the old flowers market and other trades in Covent Garden.

In accordance with Colin Ward’s and Van Eyck’s theories about “the child in the city” (Van Eyck, 2006; Ward, 1978), the important characteristic about indoor dwellings and its context is not only “what it is” (morphologically) but also what “it does” to the tenants’ lives (Ward, 1978). Both case studies are examples of a well-connected “street in the sky” and continuous corridor, which accommodates playgrounds or tenants’ particular use for the street and common spaces. Villaggio Matteotti provides a continuous nonlinear street for its “events” and activities, open spaces, and also covered parts inside the buildings, altogether generating a gamut of thresholds in the street in the sky (Fig. 11A). Odhams Walk provides a street-in-the-sky ring and a continuous space through the indoor courtyard, which merges with the environmental garden created inside (Fig. 11B).

The “eyes on the street” concept analyzed by Jacobs (1992) in American cities is present in both projects because tenant safety and freedom create a sense of belonging due to their zigzag distribution and rotational geometries. As a result, a heterogeneous domestic landscape based on the square and L-shaped configuration of the floor plan is created in both case studies. In an interview with a tenant in Terni, she shared,

The stelle is really imprinted in our minds [She uses “*Le Stelle*,” which literally “comet stars,” to refer to the streets in the sky, the three walkways that connect the facilities and have an elevation of + 3.00m] When I was little, I loved going from one place to another one “flying.” Now, it’s still



**Figure 11** Space syntax diagrams of Odhams Walk and Villaggio Matteotti (neighborhood scale).  
Source: Own elaboration.

the same, you can go from one place to another without going down to the ground floor, without using cars. One, such as a parent, has a secure feeling, and therefore, the quality of life is high. It's indescribable.

Fig. 11 shows the space syntax (Hillier and Hanson, 1984) of both projects and their connections. On the basis of König's theorem or graph theory, the first case study presents a ring or a circular spatial organization, where facilities and greenery are contained, whereas the second case study has a bone linear structure with houses and terraces branching out from the principal linear space. Furthermore, the second case study presents a chain spatial organization with a "grid," that is, the pedestrian central street is the "servant space" of the dwellings and the "street in the sky" breaks the apparent linear hierarchy. The staircase spaces and the street in the sky to the connection between this street and its facilities demonstrate a mat-hybrid housing scheme, where intermediate spaces and hanging gardens are present.

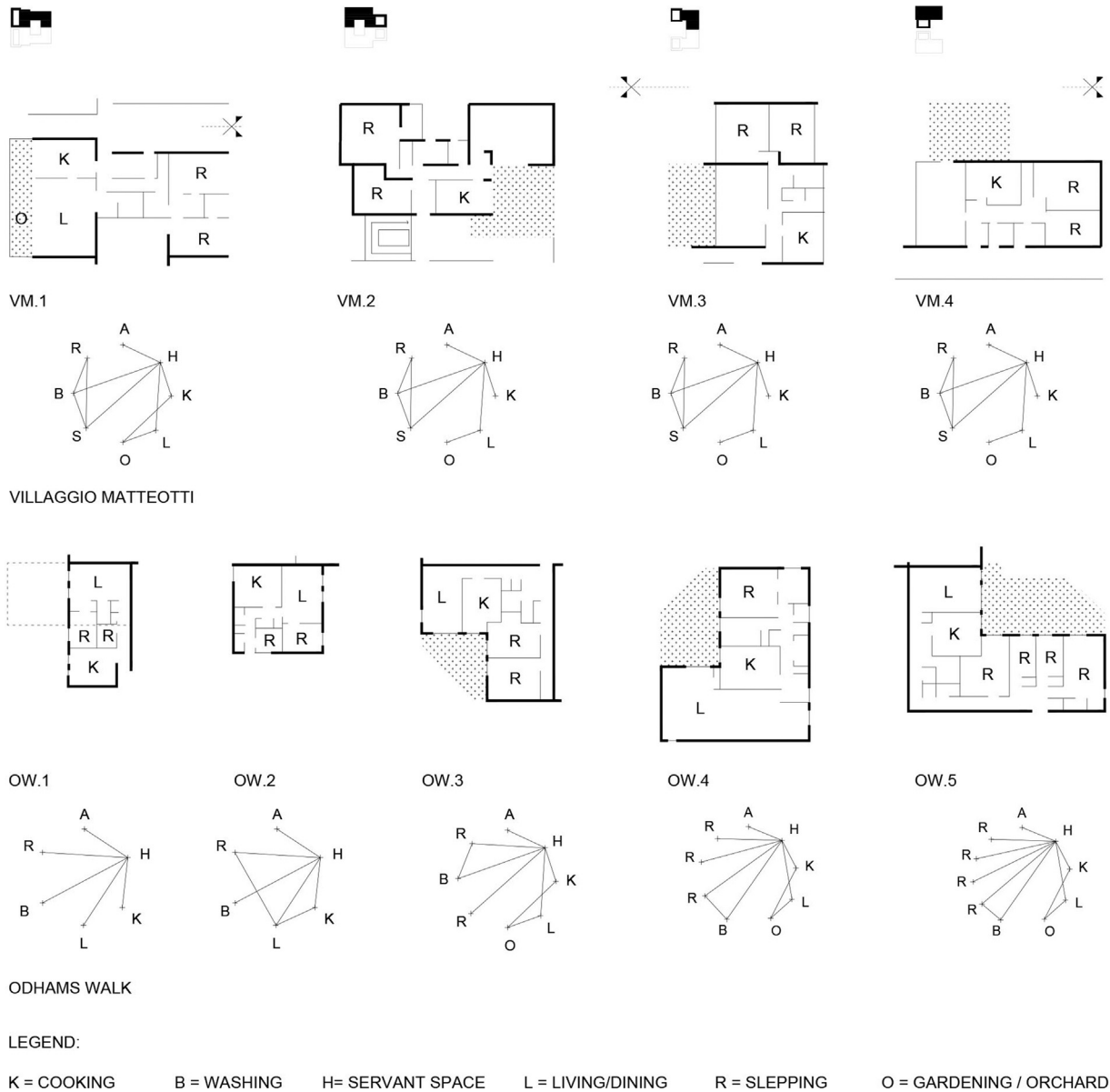
### 4.3. Ecological approach: hanging gardens and intermediate spaces

The intermediate spaces (Van Eyck, 2006) and thresholds (Teyssot, 2005) in both case studies are the spaces that allow the transition between the interior dwelling and the public pedestrian street. The connection and the gradient between

spaces create thresholds and transcend the public-private dualism (Greed, 1997). Architect and researcher Dolores Hayden (1980, 1981) presents a gender-based perspective and defends this "intermediate in-betweens," saying that "... attacking the conventional division between public and private space should become a socialist and feminist priority" (Hayden, 1980). Hayden's research in the 80s about material feminists exerts an impact on the building of collective housing and common central kitchens in European contexts.

Fig. 12 shows the domestic interior distribution space of both case studies and their synthesis using graph theory. The figure shows that H is the servant space accommodating the L-shaped and posterior dwelling group and cluster. With the complex programs and social diversity in current daily living, hybrid schemes and integrated designs are necessary in developing new approaches. In an interview with a tenant in the Villaggio Matteotti (De Jorge-Huertas and Paradiso, 2017a,b), he emphasized,

The concept of the orchards is important to clarify that their existence on three levels is a way to keep the concept of our identity and previous way of living in our houses located in the countryside. Landscape and production from land in the region of Umbria are important, many workers of Terni Steelworks were formerly peasants. This concept is developed by the project team with the *giardini pensili* for the final execution of the dwellings.



**Figure 12** Graph theory-based diagrams of (top) Villaggio Matteotti and (bottom) Odhams Walk, showing different domestic distributions. Source: Own elaboration.

Both Odhams Walk and Villaggio Matteotti take advantage of hanging gardens (hatch in points in Fig. 12): the first one through a “green ring” in the street in the sky (Fig. 12 bottom and Fig. 11B) and the second one through a linear mat-building showcasing an ecological approach by taking pedestrian green paths into the interior neighborhood (De Jorge-Huertas, 2018b), as reflected in the orchards being distributed throughout the dwellings (Fig. 12 bottom and Fig. 11A).

### 5. Discussion and comparisons

The mat-hybrid housing strategies and possibilities were analyzed in this research in five phases. First, we considered certain aspects, such as how hybrid housing can be adapted to the city context and connected at a territorial scale, the

separation between car road and pedestrian paths, and the existence of the “streets in the sky.” Both case studies connect facilities to dwellings, allowing tenant security and sense of belonging. In Odhams Walk, the cars are confined in the interior courtyard, promoting walking within the urban setting. In Villaggio Matteotti car circulation is allowed in two perimeter roads because of its peripheral location in the city. With regard to the pedestrian path characteristics of both case studies, in Odhams Walk the pedestrian corridor is a ring, and it represents a compact alternative that can accommodate a relatively high density given that the project is located in the city center. In Villaggio Matteotti the pedestrian corridor adopts an expanded linear scheme due to its location in the suburban area of Terni (Fig. 13). However, the Villaggio Matteotti project provides a natural transition between the rural and the urban contexts because of the presence of intermediate spaces,

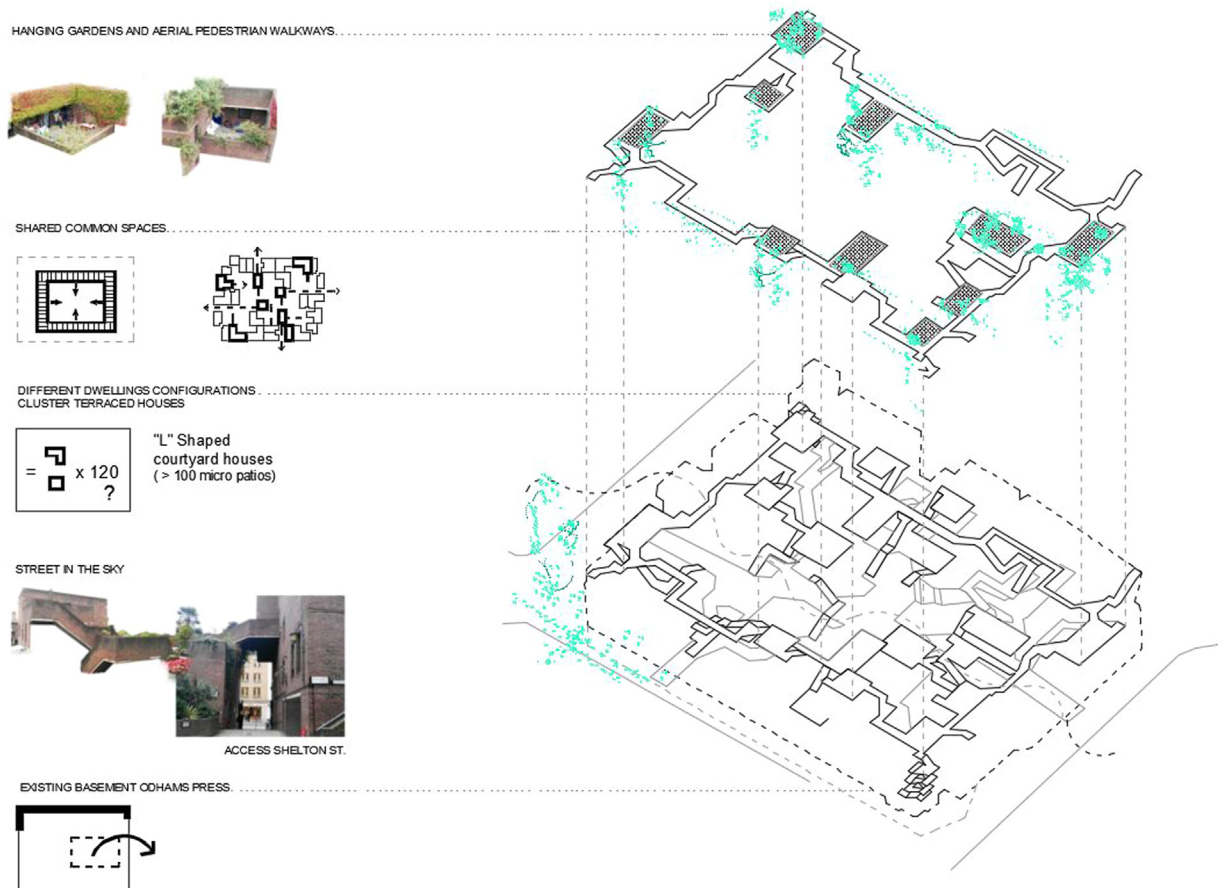


Figure 13 Odhams Walk morphology.

Source: Own elaboration from fieldwork and WCCA consult..

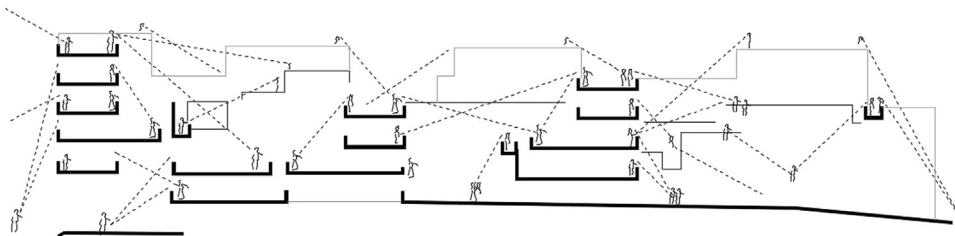


Figure 14 Visual advantages of nonconventional structures and “eyes on the street” of Odhams Walk.

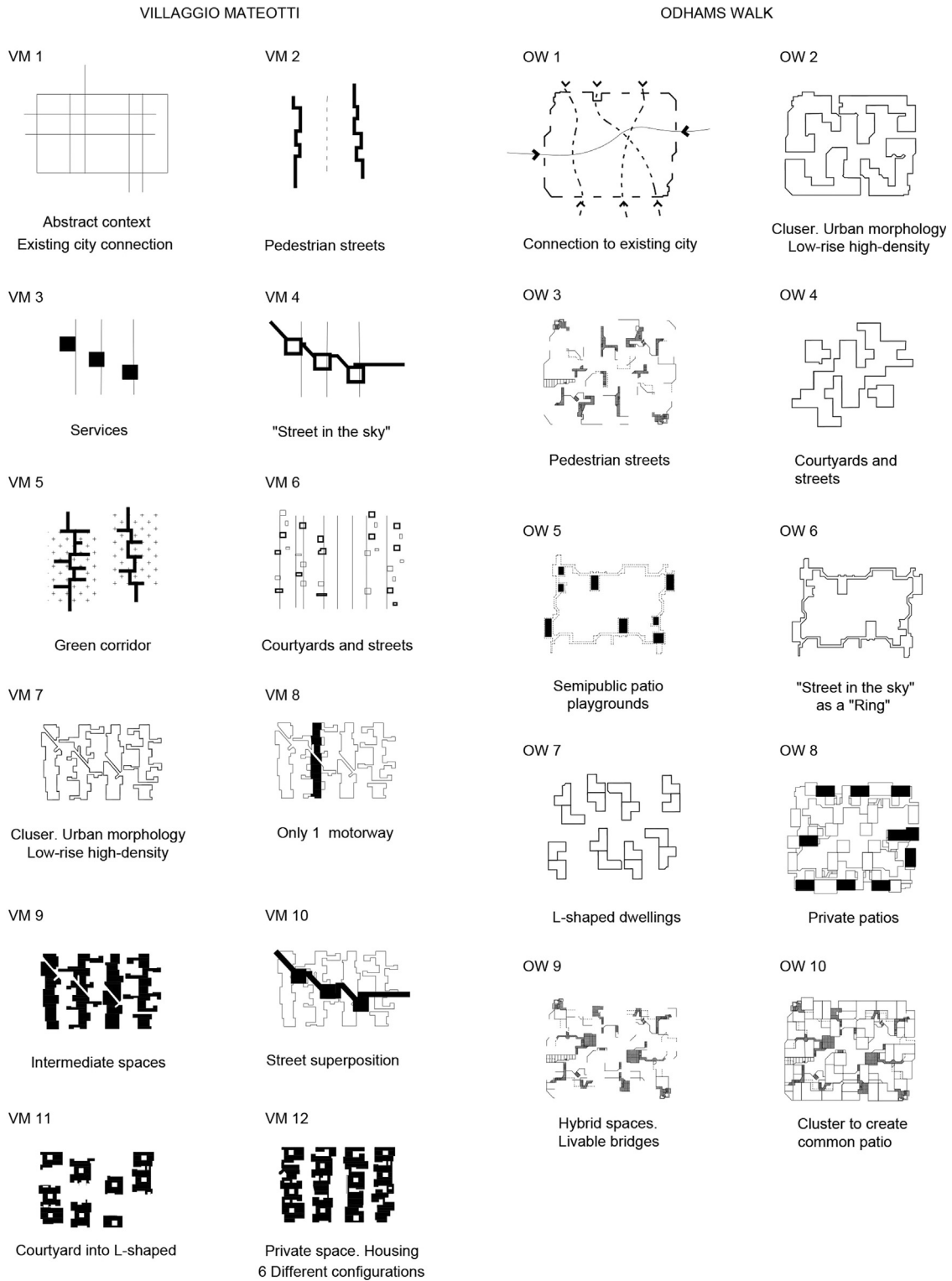
Source: Own elaboration.

and it is a hybrid project because its location is near the Umbria countryside.

Second, we focused our attention on the projects' ecological approach and connection with nature (Thompson, 1999). In both case studies, the inclusion of hanging gardens is important at different levels, from the ground floor to the topmost floor, from semiprivate to semipublic to terraces. In the Italian case study the *giardini pensili* (i.e., hanging gardens), together with the combined linear green orchards and the pedestrian streets, generate a green matrix connected to the common shared space, like the Babylon Gardens. From a tectonic point of view, the structure and the finishing of the Italian case study are concrete, following the Italian brutalism approach. By contrast, the London housing is a matrix of concrete pillars of fabrics with the same chromatic color as the neighboring buildings. The materiality in both case

studies reflects a constructive sincerity and an approach to the context of its materials' aspects.

Third, we focused on the development of the facilities at neighborhood scale. In both case studies, the facilities are projected like a cluster (Candilis et al., 1959; Smithson, 1974), groups, or aggregation, generating a spatial organization system (Fig. 14). Both buildings are innovative from a typological point of view. They are neither a block nor a fragmentary sum of elements. They are hybrid buildings (McClintock, 1950; Fenton, 1985), that is, they are a mix of several housing typologies, presenting a morphological transition between the pre-existing architecture and a new one. This analysis is conducted such that the low-level high-density approach is taken into account (Lehrman, 1966). In addition, both are mat-buildings (Smithson, 1974; Álvarez-Lombardero, 2010). The dwellings and different



**Figure 15** Key strategies of Villaggio Matteotti and Odhams Walk. Source: Own elaboration.

modules in Odhams Walks are planned following an L-shaped distribution, whereas the dwellings and their variations in Villaggio Matteotti are based on a square rotation (Fig. 14).

Fourth, we considered the projects' distribution and "visual interest" (Lehrman, 1966), which are associated to certain

patterns of vernacular architecture (Rudofsky, 1964), such as the Kasbah or the Italian towns constructed in the hills (Fig. 13). The typological variety and domestic habitat evolution (Candilis et al., 1959) are based on the diversity of tenants and their families' needs, from a socio-economical perspective. The architects of Villaggio Matteotti proposed 5 different

typologies with 45 domestic variations, as shown in Fig. 3. The polyvalent inner organization allows a rich variability in the domestic space in accordance with the needs of the tenants. Villaggio Matteotti is in the same lines as the structuralism approach (De Jorge-Huertas, 2017) and Van Eyck's one (2006). The organization patterns of both case studies allow for growth, the possibility of a changing space, and the creation of "intermediate spaces" at the "human scale" (Smithson, 1993; Teyssot, 2005; Van Eyck, 2006).

Finally, we probed into the "architecture and participation" argument (Davidoff, 1965; De Carlo, 1970, 1977; Alexander et al., 1977) as an essential factor in developing a housing project. Cohousing (Vestbro and Horelli, 2012) and nonprofit cooperatives are alternative modes of management using participation processes, with successful case studies in Scandinavia. The tenants are considered at different stages of the design process and in different gradients, depending on the complexity of the project. Domestic architecture is a matrix or a personalized "game board" (De Jorge-Huertas and De Jorge Moreno, 2018) played by both architects and users.

## 6. Conclusions

The MHH concept is discussed and analyzed in this study (Fig. 15). However, the hypotheses should be tested and refined with more case studies in different contexts. In addition, this research focuses on three main aspects: densities, social and spatial innovative distributions, and ecological approach. The two mat-buildings are perceived as high-density medium-rise buildings. Their hybrid characteristics together with their street in the sky and hanging gardens feature an inclusive strategy. These last two elements promote social cohesion and distribution at intermediate scales between the public and the private spheres, allowing a strong integration within the urban rhythm and user's needs. Exploring new scale approaches and groupings are expected in future research. Furthermore, a possible extension of this work could follow several paths. A study may be conducted on different ecomorphological building characteristics with different management approaches from the perspectives of the users' socioeconomic status and innovation, such as housing cooperatives with assignment of use and nonprofit housing cooperatives. *Baugruppen* (construction group) in Germany can be studied, with examples like the Ökohaus in Berlin (De Jorge-Huertas, 2018a), where the hanging gardens and the infrastructure demonstrate innovative housing. Future studies may also analyze multiple approaches to collaborative housing and cohousing with common shared spaces, different options to housing tenure, and domestic distributions that could help achieve affordable and more accurate housing attuned to current users' needs.

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### Unpublished Interviews

- De Jorge-Huertas, V and Paradiso, A., 2017a. Interview with 5 tenants in Villaggio Matteotti. (Unpublished interviews. Sunday 9th July 2017, Terni, Umbria, Italy).
- De Jorge-Huertas, V and Paradiso, A., 2017b. Interview with Odhams Walk's Building Manager and tenants. (Unpublished interview. Monday 9th October 2017, London, UK).
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