The integration of new social housing in existing urban schemes: the case of Cité Manifeste in Mulhouse, France

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Abstract. *With a shortage of affordable housing, social housing has become a priority on national agendas. However, designing social housing has a poor record, as reflected in the current demolition of post-war housing 'utopias'. This paper seeks to explore how the design of new social housing could increase the resilience of urban areas and its social and spatial integration in the contextual urban fabric. It examines the twenty-first century social housing area of Cité Manifeste, designed by renowned architects as an extension of Cité Ouvrière, a nineteenth-century mass industrial housing scheme in the city of Mulhouse, France. The spatial and social performance of these two* cités *are investigated, focusing on the urban interface between the streets and houses, and its patterns of evolution. Both schemes are well embedded in the wider street network, and Cité Manifeste has integrated better into the old quarter spatially than socially, yet not all parts of the design perform similarly. The comparison of the two* cités *and their components provides insight into the impact of architectural and urban design on the viability of housing developments.*

Keywords: social housing, socio-spatial integration, evolution, urban interface, space syntax

In Europe, more than 80 years after the post-war reconstruction period and the failure of modernist *tabula rasa* ideas, housing development shifted to, on the one hand, the refurbishment of old stock and, on the other, the integration of new houses into existing built environments. The two strategies take account of such matters as the local economy, existing social networks, community infrastructure, invested money and time, and residents' mental health and wellbeing (Crawford *et al*., 2014; Power, 2008, 2010). However, assessment of the success of refurbishment first needs to consider the socio-spatial integration of housing projects.

While segregation is not necessarily bad (Peach, 1996), there is a high degree of correlation between physical integration of residential schemes and the socio-economic prospects of the residents, as well as the long-term viability of the schemes themselves. To consider this further, space and society, design, and time are examined in this paper.

Space syntax studies (Franzén, 2009; Hanson and Zako, 2007; Hiller and Hanson, 1984, 1987; Legeby, 2009; Vaughan, 2005; Vaughan and Hillier, 2007) have argued that spatial integration relates to issues of employment, access to services, and social interactions, influencing mostly socio-economically disadvantaged people as in the case of social housing. With regard to the role of design in the viability of new housing, Hillier and other scholars (Hillier, 1973, 1988; Hillier *et al*.,

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1987, 1992) have explained how architectural and urban design led most of the post-war housing projects to failure and eventually demolition. Enclosure, hierarchy of private and shared spaces, and the notion of 'territoriality' (Newman, 1972) reduced physical contact. Public life was deprived of probabilistic human encounters, making neighbours and inhabitants 'strangers to one another' (Hanson, 2000). Low probabilities of social co-presence meant fewer 'eyes on the street' (Jacobs, 1961) and less control of strangers over space and of inhabitants over strangers, resulting in a rise of antisocial behaviour. Furthermore, there is the matter of integration with the evolution of housing design over time. Motloch (1991) demonstrates that it is important that architects address the natural, structural, and infrastructural systems – spatial and social – in terms of the dynamic nature of change. The ways that past designs have performed over time can inform architects about the present and future of urban housing.

This paper investigates the role of design in the physical and social integration of urban housing. On the one hand, it explores the spatial relation of housing schemes within the city context and, on the other, it investigates the inclusion of new architect-designed parts in old and vernacular residential areas. The objective is to deconstruct the relationship of the housing with its urban settings through the patterns of its diachronic evolution and their effect on the lives of residents. In particular, the paper examines the socio-spatial response of the new Cité Manifeste in the urban and symbolic context of the old Cité Ouvrière, in the former industrial city of Mulhouse in eastern France (Figure 1). Cité Manifeste, a twenty-first century social housing experiment designed by five renowned architectural teams was built as an extension to Cité Ouvrière, a nineteenth-century industrial housing scheme for textile factory workers. Light is shed on the impact of design on the sustainability of social housing. The political agenda behind the making of social housing in different periods in France is also revealed.

Methods

The paper presents findings from an investigation using a space syntax quantitative approach (Hanson, 1998; Hillier and Hanson, 1984) accompanied by a more qualitative study. The two methods complement each other and in combination they can provide a comprehensive understanding of socio-spatial performance.

Space syntax theory and tools (Hillier and Hanson, 1984) enable the analysis of urban systems at different scales and the understanding of configurational relationships within and across various systems based on the network analysis measures of 'integration'

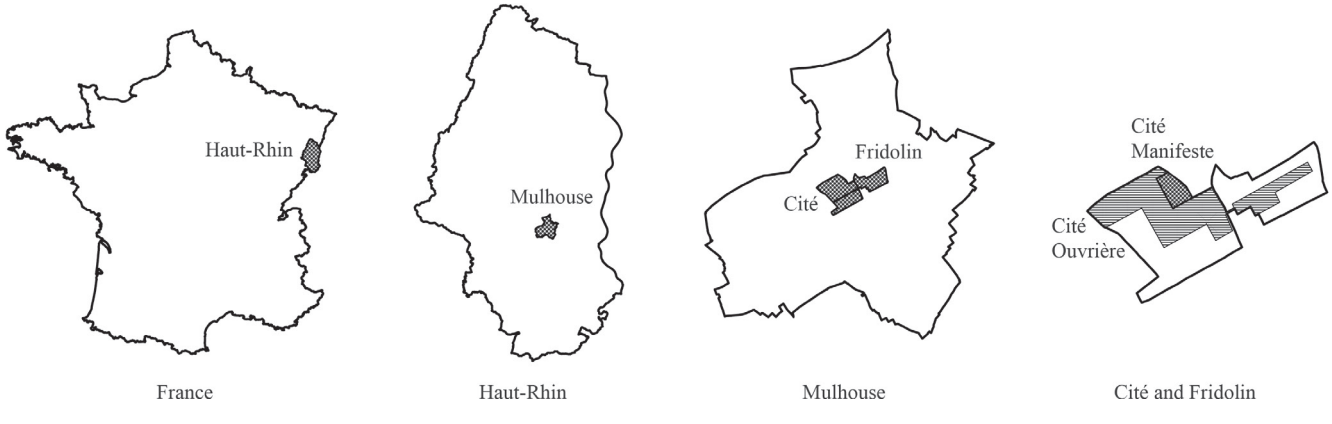


Figure 1. From left to right: Department of Haut-Rhin within France; Mulhouse within Haut-Rhin; Cité (Fonderie Nord and Sud) and Fridolin Sud quarters within Mulhouse; and Cité Ouvrière and Cité Manifeste schemes within the two city quarters.

Figure 2. The area of detailed study (highlighted), which includes 15 blocks, 93 plots and 153 houses of which 61 belong to Cité Manifeste and the rest to Cité Ouvrière. The shaded houses are the 54 surveyed ones from the two cités. The thick broken line indicates that part of the boundary between the two cités within the area of detailed study.

(to-movement) and 'choice' (through-movement). The paper addresses two scales: the city and the neighbourhood. At the first scale, the analysis demonstrates the potential of to- and through-movement inside and outside the two *cités* and in relation to the whole city of Mulhouse.

For the second scale, an area of 15 blocks, 93 plots and 153 houses (Figure 2) is examined. Then the two cités are compared with regard to building coverage, accessibility, permeability and visibility of boundaries. The main focus here, however, is on the interface between the houses and the street, which impacts on the residents' quality of life (Hanson 1998, 2000; Hanson and Zako, 2007; Palaiologou and Vaughan, 2012; Zako and Hanson, 2009). Using a set of morphological measures first used by Hanson (2000) in the nineteenth and twentieth century Somers Town estates in London, the quality of life within the neighbourhood is evaluated, setting the findings within a wider context.

Finally, the paper employs a qualitative research approach regarding the social aspect of integration. Essentially, the authors spent time discussing with local residents, taking pictures and observing in person the daily

lives of people and their relationships to their houses. This qualitative method is enriched by information provided by in-depth interviews with the residents of Cité Manifeste.

It is not intended to investigate the interior spaces of the buildings, which could explain in greater detail the social implications of architectural design, especially the housing cultures of different eras. Regarding the timing of the study, Cité Ouvrière has existed for more than 160 years showing a longer process of transformation over time, whereas Cité Manifeste is relatively recent and radical changes to the houses are very unlikely. This is important when the performance of urban housing is tested. Furthermore, a critical point in this study is the experimental nature of Cité Manifeste, though it does not constitute an impediment to the analytical research of its performance as an effective piece of urban fabric. Gromark (2008, p. 2) calls Cité Manifeste 'extreme housing' because its 'spatial advention [worked] as a creative catalyst …, radically altering inhabitants' domestic space practices'. Cité Manifeste was not only an exploration of how to build attractive, economically and environmentally sustainable social housing in the twenty-first century. It was also a manifesto for the need for contemporary social housing to respond to the changing cultural dispositions of society. The same is true of the case of Cité Ouvrière, where the first development included experimentation with new socio-political ideas, a financial model, urban planning and domestic architectural types (Jonas, 2003). In this sense, both Cité Ouvrière and Cité Manifeste have been exemplary cases of housing responses to social and political conditions and worth taking into consideration as residential strategies for further reflection.

Urban integration through incremental spatial changes: the old Cité Ouvrière

Cité Ouvrière was built in three phases between 1853 and 1897 by the Société Mulhousienne des Cités Ouvrières (SOMCO) for the workers of the city of Mulhouse. The poor living conditions of the working class surveyed in 1843 by Dr A. Penot, in 1835–7 by Dr. L. R. Villermé and in 1858 by Reybaud (Jonas 2003, p. 146), convinced the industrialists to sponsor affordable housing for the labour force. New housing was under a rent-to-buy scheme, easing the transition for workers from renting to buying during a period of 13–15 years. Manifesting the nineteenth-century ideas of social reform, housing and ownership acted as mediums of social control, moralization, and enhancement of industrial production (Demolins, 1881; Ermenc, 1957; Garner, 1992; Penot, 1867; Shapiro, 1982; Trélat, 1880). In Mulhouse, the philanthropist model included turning the worker into an *ouvrier rangé* (Jonas, 2003, p. 151).

Cité Ouvrière was built on the northern periphery of Mulhouse between the André Koechlin & Cie (AKC) engineering industry, and the Schlumberger, Fils & Cie and Dollfus-Mieg & Cie (DMC) textile factories (Jonas, 2003, p. 160). However, as the city grew, it was embraced by the street network and became almost centrally located (Figure 3). Previous research (Kostourou, 2015) showed that, despite the urban socio-economic decline of Mulhouse since its deindustrialization, it has avoided demolition and replacement; instead, it has acquired resilience and social stability over the years.

Certain spatial qualities that enabled it to become spatially sustainable have become evident: (1) the integration of the housing scheme at both local and wider scales, (2) its intensified grid with small and dense blocks, and (3) the capacity of the domestic built form to adapt over time. Space syntax analysis at the city level (Figure 4) indicates a neighbourhood that is topologically integrated at local scales, and surrounded by highly accessible streets at a wider scale, which may attract non-residential activities. Through-movement and to-movement potentials are structured along the peripheral and main streets, becoming more marginal inside the purely residential areas. Furthermore, the blocks' placing, shape and size give prominence to a morphologically distinctive local area. As a result of the cité's dense street grid, which reduces travel distance from all origins

Figure 3. Top: Urban growth of Mulhouse from 1850 to 1910. The bold dark lines indicate the development phases of Cité Ouvrière over time. The dotted areas represent the industrial facilities, the first one to appear being the DMC factory. Drawings reproduced by the authors based on historical maps from http://www.mulhouse.fr/fr/plans-historiques-de-mulhouse/plans-historiques-de-mulhouse.html. Bottom: The commune of Mulhouse and its road network in 2015.

Figure 4. Segment angular analysis of integration (to-movement (top)) and choice (through-movement (bottom)) measures at the wider scale. The commune of Mulhouse is highlighted in grey.

to all destinations, a large number of houses are easily accessible, enhancing the degree of accessibility for the entire area. Jonas (2003, p. 120) explains that the Plan General of 1853 dictated a high number of streets for purposes of hygiene, morality and architecture, providing each single-family house with access to the network. Not least, the adaptability of the houses, together with an urban layout that accommodates effectively physical growth over time and flexible legislation at the level of individual buildings (Kostourou, 2015; Palaiologou and Kostourou, 2016), have added to the long-term viability of the scheme.

Benefiting from existing potential: the new Cité Manifeste

In view of the 150th anniversary of Cité Ouvrière and in order to give an alternative to the typical Habitation à Loyer Modéré (HLM) housing, SOMCO launched Cité Manifeste as an extension of the old cité on the brownfield land of the Dreyfus & Cie cotton factory. Atelier Jean Nouvel invited four more architectural teams, Poitevin & Reynaud (Art'M/Scpa), Duncan Lewis and Hervé Potin with Block, Lacaton & Vassal, and Shigeru Ban with Jean de Gastines, to build 61 houses, for the same budget as that available for the standard governmental HLM. Given a limited budget, they all sought maximization of living area and flexibility of programme in space and time (Guth *et al*., 2013). For example, in the traditional design of Poitevin & Reynaud, the living area was increased by 20 per cent, while the open-plan Lacaton & Vassal T4 design provided for the standard price a surface area of 130 m^2 – instead of the HLM's 75 m^2 (Table 1). However, though the new cité was under a social-housing funding scheme, the experimental nature of the venture caused the budget to be exceeded by 12 per cent (Guth *et al*., 2013).

Cité Manifeste's goals were twofold: (1) give prominence to the old residential scheme, which to a certain degree had been put at risk of obsolescence since the city's deindustrialization; and (2) make social housing attractive again. The architects, who worked together under the guidance of SOMCO's then director Pierre Zemp, divided the former *îlot* Schoettle into four orthogonal street blocks and one triangular one, split into three trapezoids. Aiming at ensuring unity between the two schemes, the master plan proposed that the west-east passages of Cité Ouvrière be lengthened, retaining their narrow width of 2.5 m (Figure 5).

Space syntax analysis supports the success of this master plan. Effectively, Cité Manifeste, as an extension of a centrally located housing scheme, shares similar configurational characteristics with Cité Ouvrière. Not only does it benefit from the embeddedness of the area, but the straight street extensions also enhance the accessibility and visibility of the houses locally (Figure 6).

Cité within a cité: creating a social gap between two schemes

Establishing urban continuity does not necessarily imply the physical and social integration of new housing schemes. The first tenants of Cité Manifeste were originally selected by SOMCO in order to generate social diversity in terms of age, financial situation and family composition. At the beginning, the tenants supported the experiment by creating opportunities to build social bonds with their neighbours. For instance, SOMCO has been holding yearly celebrations in the area to honour the venture, while the residents have been organizing frequent informal dinners among themselves (Figure 7). Gradually, however, the social commitment waned. In the study by Guth *et al*. (2013, pp. 351–74), the interviewees manifested their social unity and good neighbourliness, but only within the Cité Manifeste. The majority had not registered their children at local schools and colleges, and most residents stated that the interaction with children residing outside the scheme, and thus of lower social status, was best avoided.

Table 1. Living areas, building coverages, rents and average building costs, distinguished by architect and rent type in Cité Manifeste and by house type and changes over time in Cité Ouvrière

Cité Manifeste

Architect	Living area (m^2)	Building coverage (% per street block)	Rent (T4 type) (€)	Rent (€/m2)	Average building cost (€ per house) with / without VAT
Poitevin & Reynaud	95	61	493	5.2	132 482 / 83 522
Lewis and Potin with Block	85	51	478	5.6	135 889 / 97 500
Lacaton & Vassal	130	69	520	4	114 186 / 76 641
Ban with de Gastines	85	39	475	5.6	130 118 / 99 135
Nouvel	127	46	544	4.3	152 900 / 110 187

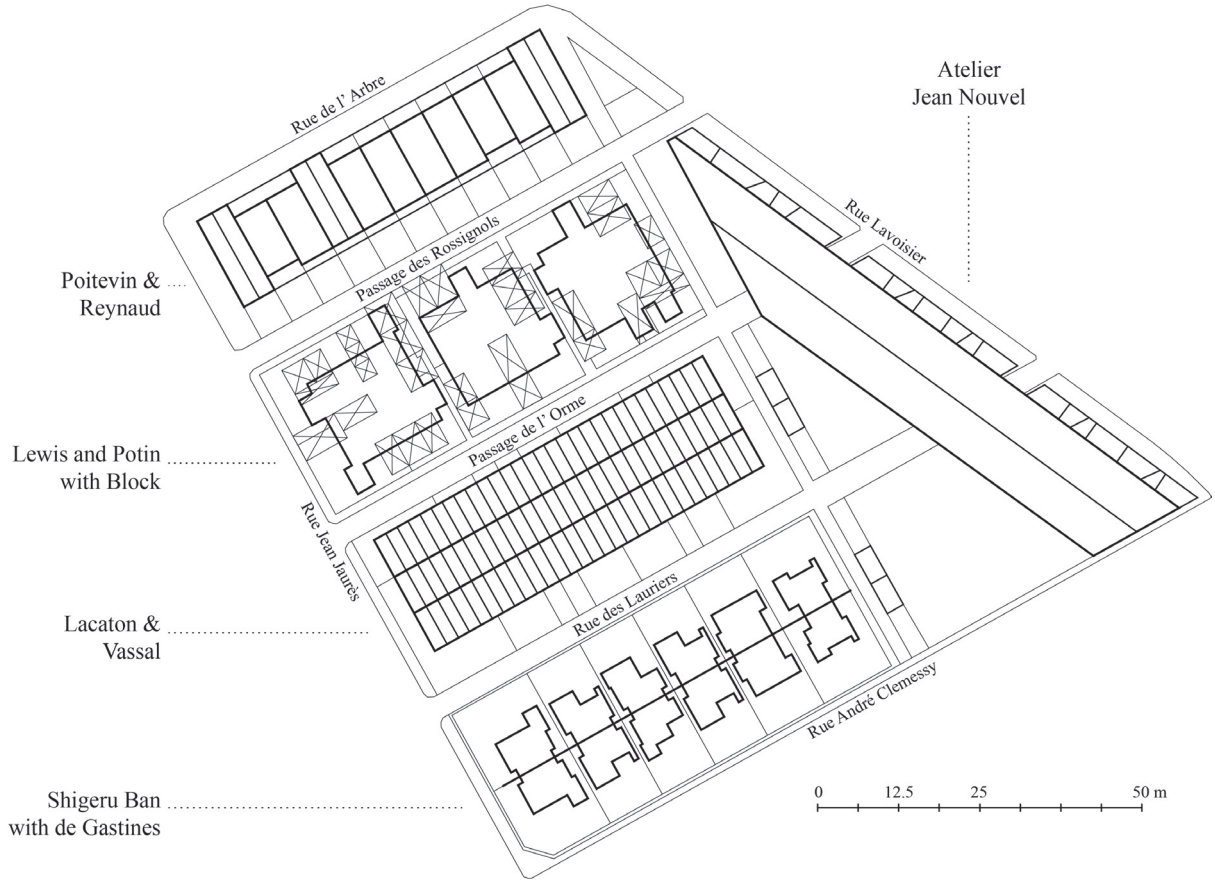
Cité Ouvrière
First cité (1853–55)

House type		1855	2014			
Terraced	52	23	47	473	8.9	31 800
Back-to-Back	52	18	27	282	5.3	16 576 – 19 264
Quarter Detached	50	18	30	391	7.8	21 728 – 25 984

Main sources: Guth *et al*., 2013; Jonas, 2003; Muller and Cacheux, 1889
T4 corresponds to apartment types of four principal rooms, including living room, dining room and bedrooms.
The rents for Cité Manifeste were provided by SOMCO in 2014. The rents for Cité Ouvrière are approximations after a survey of local real estate agents conducted by the authors in 2014. The historical Cité Ouvrière building costs were calculated according to the equivalent in grams of gold (1fr = 0.29grms = 8.96€ in 1875). Notes: (1) the average salary of workers was approximately 18€ per day in 1855, compared with 1140€ per month in 2002; (2) the Cité Ouvrière scheme has opened to the free market, while Cité Manifeste is subject to the Habitation à Loyer Modéré (HLM) framework, with rent-controlled housing having a rent cap set by the state according to the social and income level of the residents.

The same study gives the impression of a rather introvert and self-referential Cité Manifeste. As one tenant stated, it is a 'cité within a cité' (Guth *et al*., 2013, p. 369) and to a certain extent, its size, avant-garde architecture and the simultaneous arrival of its tenants contributed to this élitism. It can be argued that the way urban space was designed created a separation from the old neighbourhood. And the massive media coverage and huge marketing campaign further aggravated this feeling.

Operationally, the two cités also differ. Cité Manifeste's tenants have no right to make changes to their houses unless SOMCO and the architects give their permission. In this way it is believed that the identity and architectural legacy of Cité Manifeste is preserved so that every new tenant has the opportunity



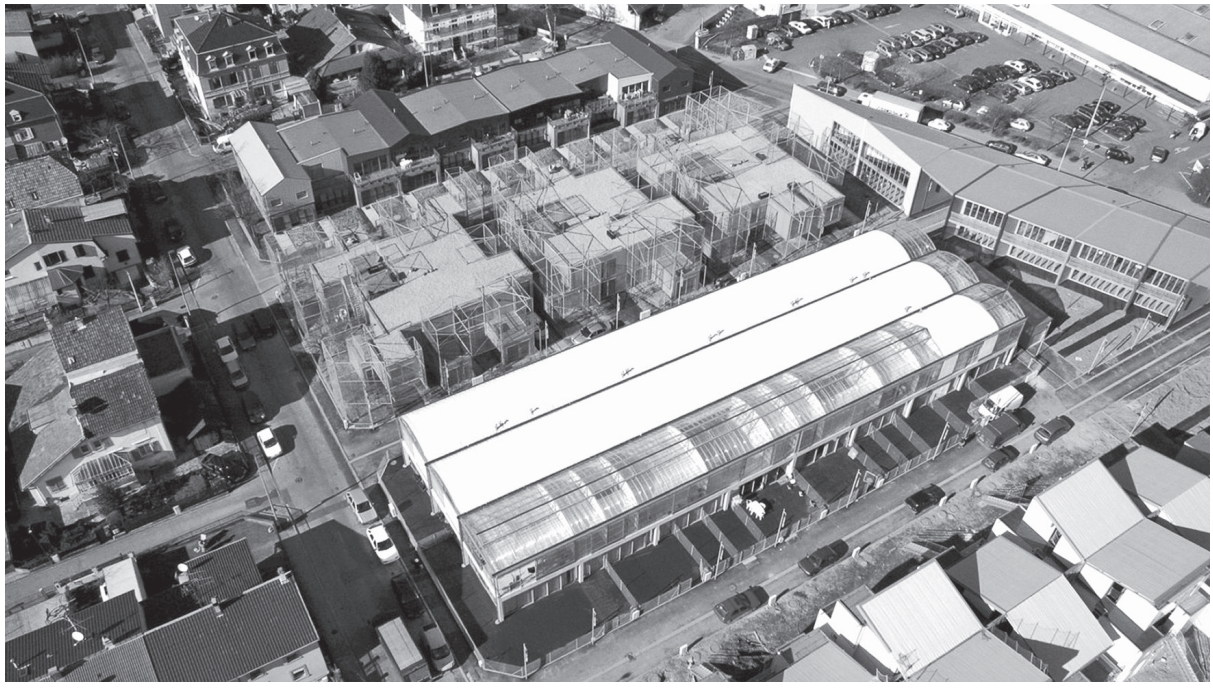


Figure 5. Cité Manifeste urban layout. Top: Drawing reproduced by the authors based on the master plan drawing by Lacaton & Vassal (http://lacatonvassal.com/index.php?idp=19#). Bottom: Aerial view of Cité Manifeste. Photograph by Euro Photo Ballon, edited by the authors.

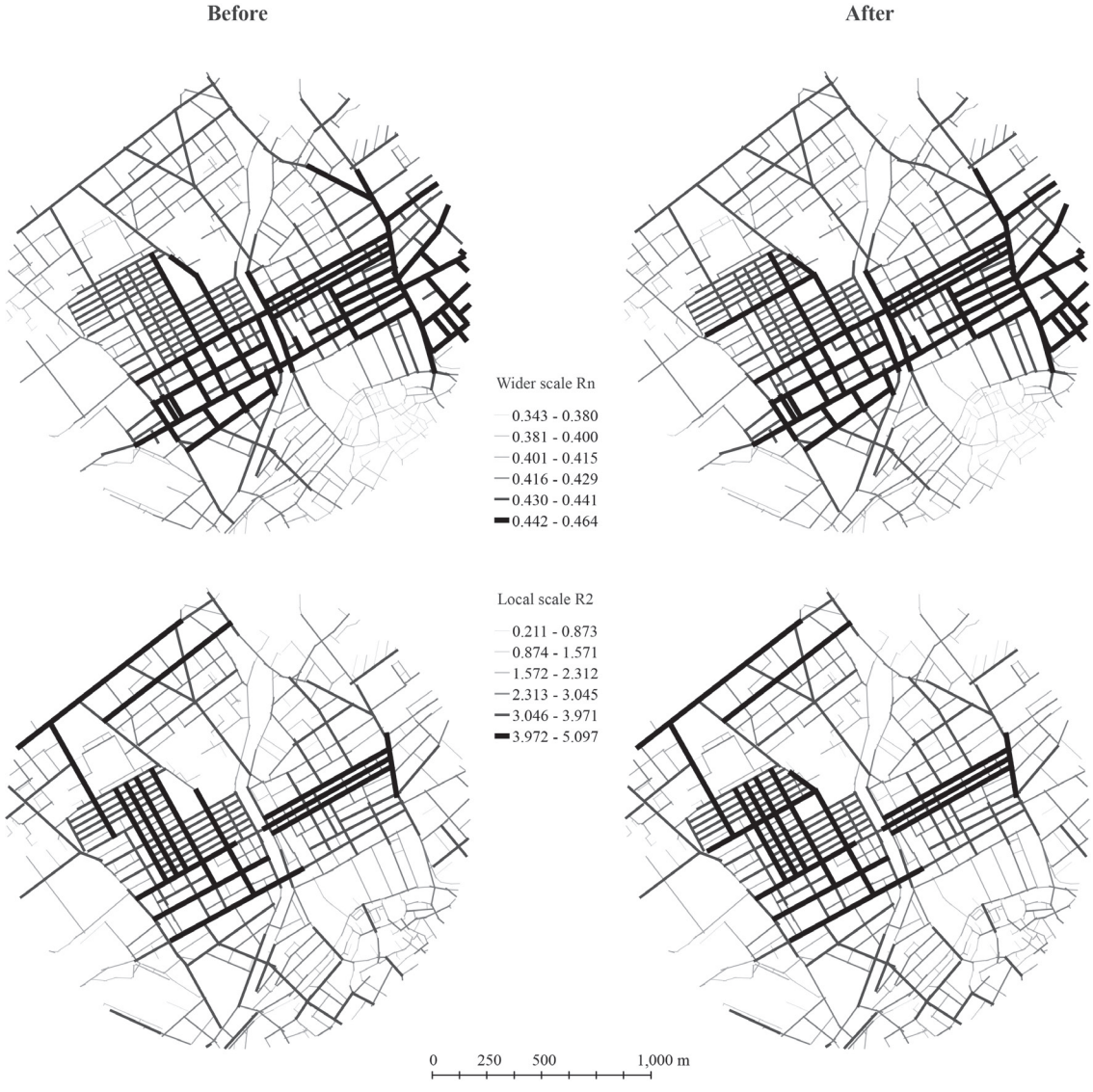


Figure 6. Axial integration analysis before and after the west-east street extensions of Cité Manifeste's layout. The axial map shows the fewest and longest lines of sight and movement in the street network (Hillier and Hanson, 1984). Top: Integration HH at the wider scale, namely the whole city network. Bottom: Integration HH at the local scale (R2), that is a topological distance of two steps away from each axial line.

to experience the same high-quality built environment as was originally conceived. Surprisingly, however, SOMCO's documents reveal that only one-third of the first tenants still reside there after 13 years. This is reportedly owing to problems regarding the houses' performance, such as thermal comfort, insulation, leakages, flooring, high transparency in windows and maintenance costs (Guth *et al*., 2013). In the case of Nouvel's design, which shows less affinity with the older housing types, nine out of the ten households moved out within a short time.

Nevertheless, Guth *et al.* (2013, p. 384) mention that, despite the constraints, tenants have invented new ways of appropriating and using their spaces. Many units have co-hosted micro-business premises, such as beauty salons, massage studios, art studio and galleries, dance studios and home schooling.

Figure 7. Some of Cité Manifeste's residents having an informal dinner in June 2014. The dinner is taking place in passage des Rossignols, one of the west-east street extensions. Photograph by the authors.

Modifications of the heating, kitchen, floors, curtains and gardens could also be noticed. Despite the preservation of the physical space, it seems that some adjustments have been made.

To further test these findings, a short survey of 54 households, 27 from each cité, was conducted (Figure 2). Questions covered gender, age, occupation, civic status, distance to work, means of commuting, sense of community, level of satisfaction, relations with neighbours, state of occupancy, and house transformations made during residence. A key finding was that residence satisfaction was 93 per cent in Cité Ouvrière compared with 79 per cent in Cité Manifeste. Households from both schemes have friendly relations with their neighbours, who are usually from the same cité. However, when it comes to the sense of community, safety and satisfaction with the neighbourhood, Cité Manifeste performed better.

From a social point of view, there is a high level of ethnic diversity and dominance of property owners in Cité Ouvrière. In contrast, Cité Manifeste's residents are all tenants and 96 per cent of them are French. In terms of professional status, most men from Cité Ouvrière are retired and the women primarily do the housework. A large number of Cité Manifeste's respondents are engaged in intermediate professions.

A separate comparison was made just among the respondents in Cité Manifeste. Five households from each street block were polled. A first finding was that the Lewis and

Potin with Block design (Figure 5) had the lowest percentage in terms of housing satisfaction and perception of safety. Not long after the project was handed over to the inhabitants, there were reported incidents of undesirable people occupying intermediate open spaces owing to obstructed visibility from the street. In the survey, two women referred to problems related to parking, window blinds, heating and concrete flooring. Respondents in Nouvel's street block were also dissatisfied with their residences and did not feel part of the community. A man reported problems of isolation and inadequate heating. A woman referred to gaps in the wall that permitted cold to enter, and to the malfunctioning of the electrical heating. Finally, the inhabitants of blocks designed by Lacaton & Vassal and Poitevin & Reynaud appeared to be very satisfied with their houses. However, half of those living in the block designed by Lacaton & Vassal stated that they did not have friendly relations with their neighbours.

The spatial performance of housing: investigating the urban interface

Regarding the physical aspect of integration, the two cités are compared on the basis of the urban interface between their houses and the street, 'the former being the domain of inhabitants and the latter being the domain of strangers' (Hillier and Hanson, 1984, p. 17). In relation to both the design and evolution of the interface, the findings result from an analysis of the current layouts of Cité Ouvrière and Cité Manifeste in 2014, and a comparison between the initial and current layout of Cité Ouvrière in 1897 and 2014.

The main difference between the two time periods is in densification (Figure 8). Cité Manifeste was entirely built at one time, while the number of houses in Cité Ouvrière has grown incrementally beyond expectations. The original 26 per cent building coverage (building area divided by plot area) for this sample of Cité Ouvrière rose to 44 per cent over time. This is an almost 69 per cent increase over the past 120–160 years and there is still room for further extensions, given that the regulations permit a maximum building coverage of 60 per cent. Mapping the corresponding increase per plot reveals different but synchronic speeds of the densification process. The building coverage ratio in Cité Manifeste is much greater than in the old quarter. However, it can be argued that the incremental densification of the latter contributed to its resilience. This accords with Moudon's (1986, p. 188) assertion that: 'small lots will support resilience … By ensuring that property remains in many hands, small lots bring important results: many people make many different decisions, thereby ensuring variety'.

In further analysis, six morphological measures were employed to form an interface index to help evaluate further the socio-spatial performance of the two cités. With Hanson's definitions in mind (2000, p. 104), the measurements (Table 2) suggest that both housing experiments in their current state are inviting and accessible. The outside spaces, fragmented as they might be in terms of ownership, form a *continuous* and *united* interface with the dwellings. Jonas (2003, p.120) first noted the continuity of these open spaces, arguing that their configuration added a second layer of urban structure on top of the street network. Furthermore, these spaces are only one step away from the street (0s in the 'Separation index') and two turns away from the busiest streets that connect the area with the rest of the city. The striking 'No-neighbours score' (close to 1) indicates that most street segments are well provided with entrances: what Hanson (2000) calls an 'all-neighbours' model, which encourages social interactions among neighbours.

Comparing these results with Hanson's work on Somers Town in London provides further insights. The results for both French schemes are similar to those for the traditional nineteenth-century British industrial housing but differ substantially from the 1990s modernist estate model (Table 2). This means that the houses are in close proximity to the street (linear arrangements on both sides) and surrounding open spaces. Notably, the two cités

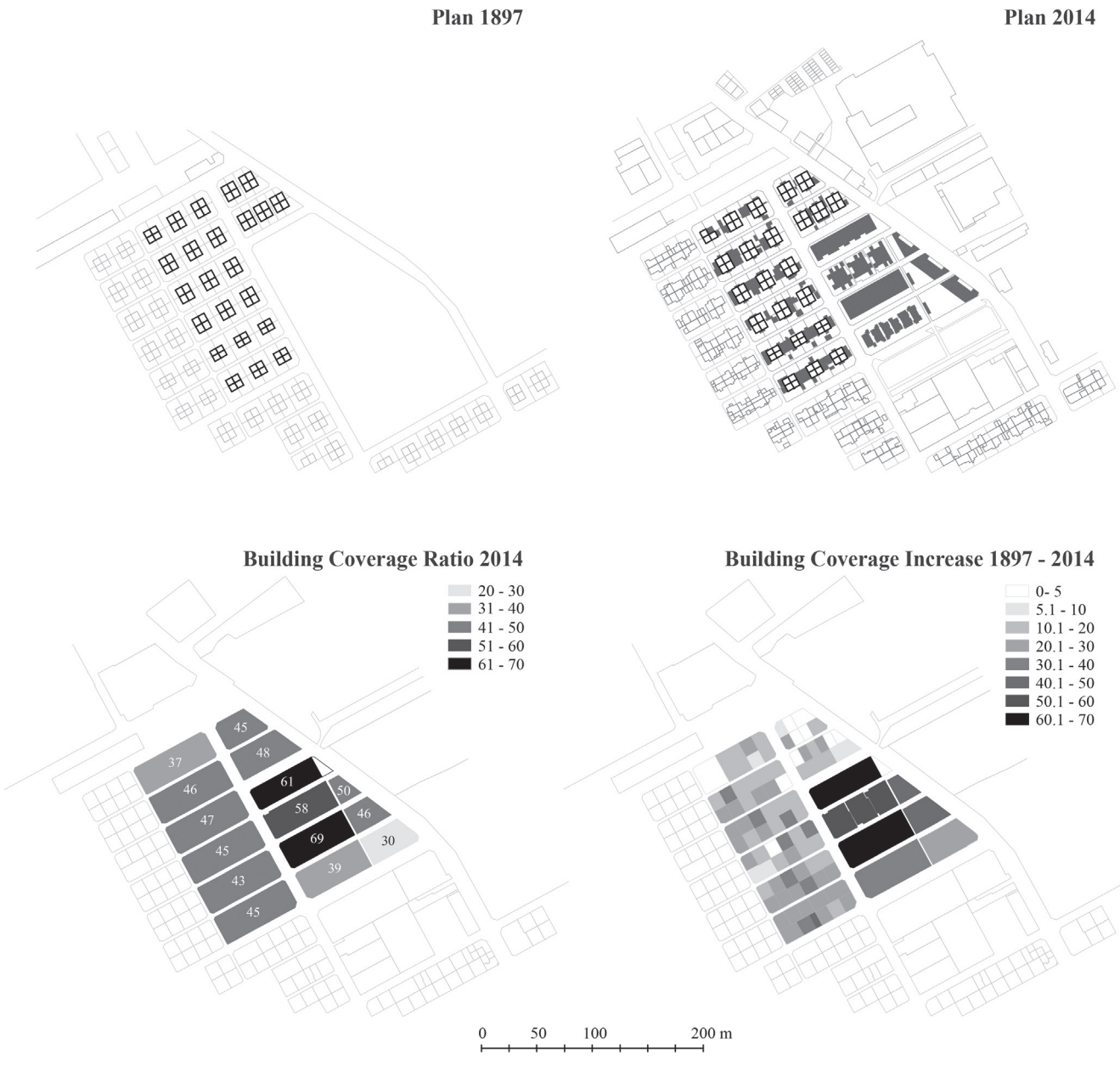


Figure 8. Top: Densification of the area of focus from 1897 to 2014. Bottom: Building coverage ratio per block (left) and per plot (right). While the densification process in Cité Manifeste was abrupt, Cité Ouvrière evolved based on different decisions at the individual plot level.

are simple traditional urban models with *street-oriented*, *outward-facing* and *stranger-friendly* housing layouts.

However, the numbers vary widely in the 'Constitutedness rate' (percentage of street segments constituted by entrances). Cité Manifeste scores one-third lower than its neighbouring scheme, which means poorer conditions for socializing. In fact, the access and adjacency graphs of 1897 and 2014 (Figure 9) indicate that the incremental densification of Cité Ouvrière has increased the possible access links from the houses to the street. This created more circulation choices (rings), affecting strongly the way houses relate to the exterior and how inhabitants interact with

Table 2. The six syntactic measures for Cité Ouvrière (CO) in 1897 and 2014 and Cité Manifeste (CM) in 2014, and combined data for Cité Ouvrière and Cité Manifeste (CO+CM) in 2014, compared with the findings of Hanson (1990) for the 1890s and 1990s in Somers Town, London

Timeline		**1897**	**2014**	**1890s**	**1990s**	**2014**	**2014**
Measure	**Definition**	**CO**	**CO+CM**	**(Hanson)**	**(Hanson)**	**CM**	**CO**
Maze index	Mean depth of axial system from surrounding streets	0.6	0.64	1.86	1.85	0.6	0.5
No-neighbours score	Mean depth of all convex system from entrances	1.3	1.23	1.06	2.46	1	1.33
Separation index	Mean depth of surrounding streets from nearest entrances	0	0	0	3.21	0	0
Constitutedness rate (%)	Percentage of convex spaces constituted by entrances	70	84.6	94.5	24.1	100	66.7
Neighbourliness score	Average number of entrances per constituted convex space	13.14	23.45	21.72	4.28	14.9	13.63
Interface decomposition score	Mean steps between houses considering shortest path that links all houses	1.17	1	1	1.17	1	1

The definitions are simplifications of those given by Hanson (2000, p. 104). The calculations are based on the premise that convex spaces are considered constituted only when there is a direct gate from the street to the plot, disregarding indirect building entrances.

strangers. Effectively, a 'single-entry plan' was transformed to a 'multiple-entry plan' (Hanson, 1998, pp. 67, 69). Moreover, not only have the connections been multiplied, but they have also shifted orientation, creating an urban aggregate effect out of a local modification (Kropf, 2001), especially if one considers that almost 300 corner houses (out of 1243) have followed the same pattern, establishing diagonal links to street intersections.

In other cases, the urban effect is even more substantial. For example, originally unconstituted streets without any entrance, such as rue Jean Jaurès, now reach a maximum constitutedness rate (Figure 9). Interestingly, the contribution of Cité Ouvrière in this respect is significantly higher than that of Cité Manifeste. Effectively, while the corner houses of Cité Ouvrière slowly opened up towards the street over time, the recent development of Cité Manifeste hardly gave access to it. Even more striking is the interface of rue Lavoisier on the east side of the area. Again the houses of Cité Ouvrière have perforated their

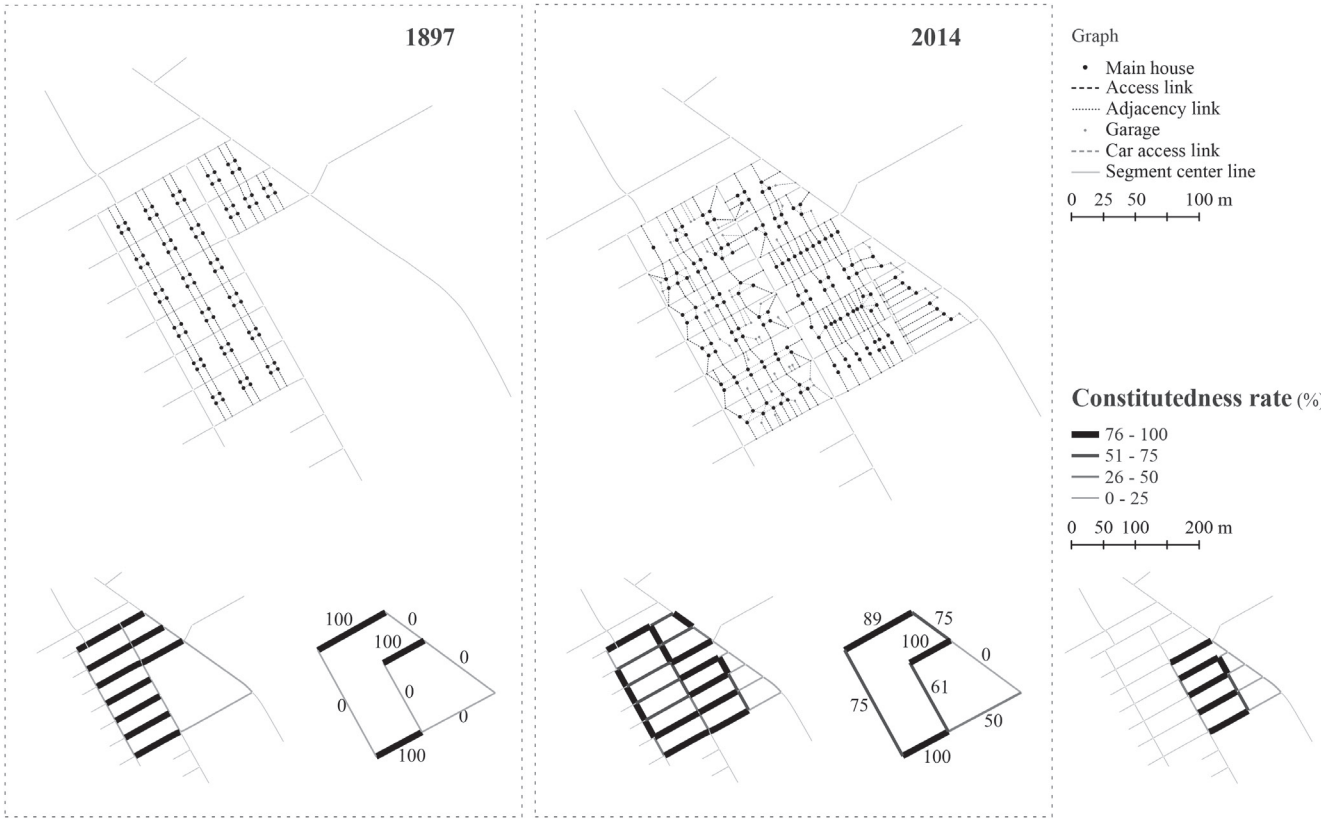


Figure 9. Top row: Access and adjacency graphs for 1897 (left) and 2014 (right) as first introduced by M. Krüger (Steadman, 1983). Bottom row: Constitutedness rate for street segment and for segment along the boundaries of the two cités in 1897 (two diagrams bottom left) and 2014 (two diagrams in the middle), and the contribution made just by Cité Manifeste to the overall constitutedness in 2014 (diagram bottom right).

originally inaccessible interface, whereas Cité Manifeste has in the case of Nouvel's design raised a continuous blank wall more than 95 m long without any front door and interrupted by only two passages (Figure 10).

An interface map for both 1897 and 2014 (Figure 11), records the location and types of entrances, as places of possible interaction between inhabitants and strangers. The map of 1897 demonstrates a repetitive and monotonous layout similar to that of many nineteenth-century European company towns (Porteous, 1970). The characteristics of the reformist agenda are prevalent: the designing of each house with a garden, usually fenced, resulting in two entries per house: the main entrance and a gate at the street boundary. Today, the number of entrances in Cité Ouvrière has increased by 62 per cent and different types have emerged with the introduction of the car in the early-twentieth century. Notably, car gates are now as numerous as pedestrian entrances.

As a result of their nineteenth-century design, house entrances in Cité Ouvrière are still indirect, and of shallow depth. This results from the provision of the single intermediary space of the front garden, where simultaneous surveillance of both the street and house could be achieved, and by extension, a stronger control of inhabitants over neighbours and passers-by. The mutual visibility of different social groups that enhances their co-presence in space, increases the probabilities for everyday encounters and a sense of safety. In contrast, two-thirds of streets in Cité Manifeste

Figure 10. Part of Nouvel's 95 m long blank wall as seen from rue Lavoisier. Photograph by Eugeni Bach, edited by the authors.

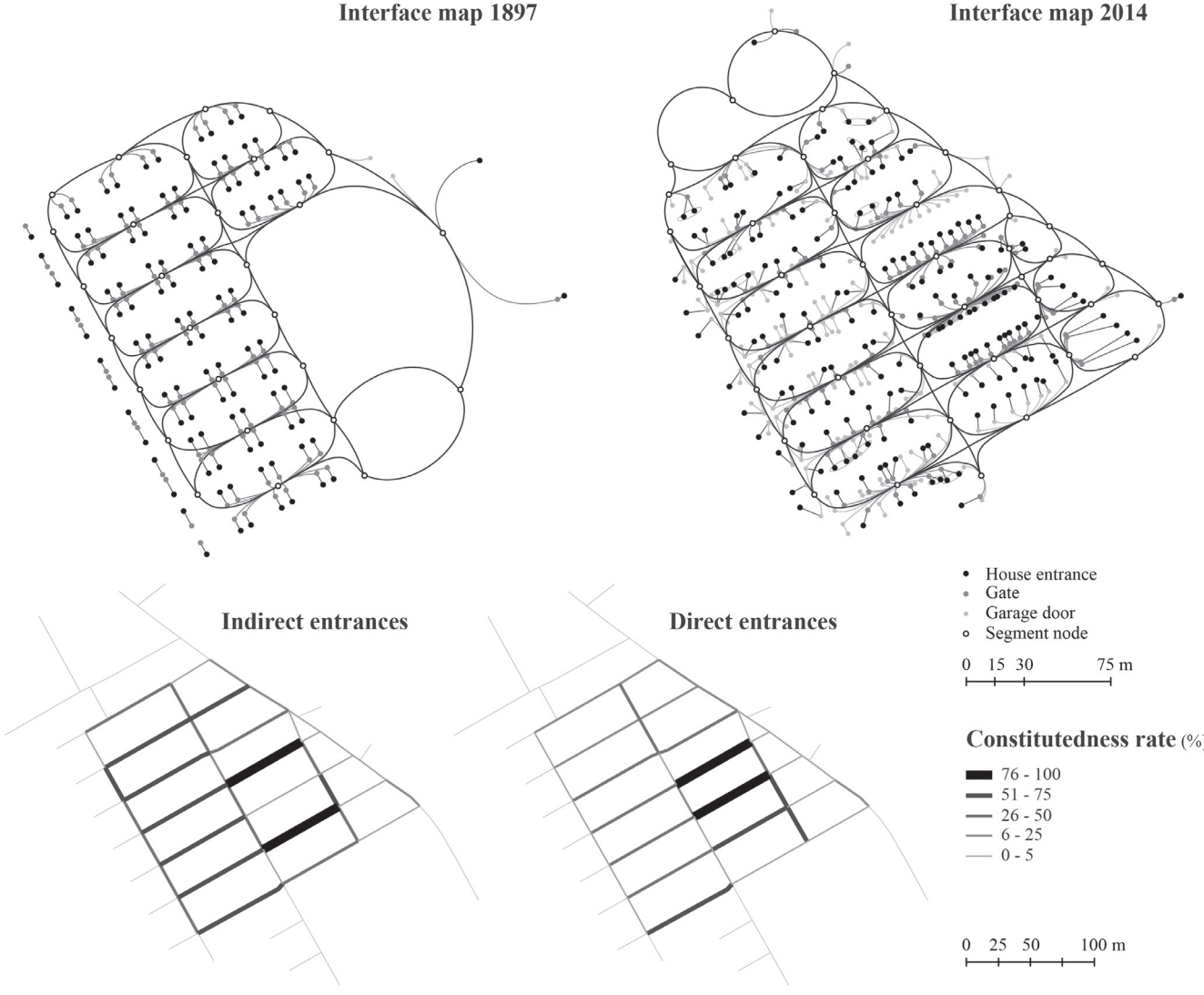


Figure 11. Top row: Interface map of 1897 (left) and 2014 (right) similar to the one introduced by Hillier and Hanson (1984). Black dots represent entrances to buildings; grey dots represent gates to plots and front gardens; light grey dots represent car gates; and circles represent street segments. Bottom row: Constitutedness rate by indirect entrances (left) and direct entrances (right).

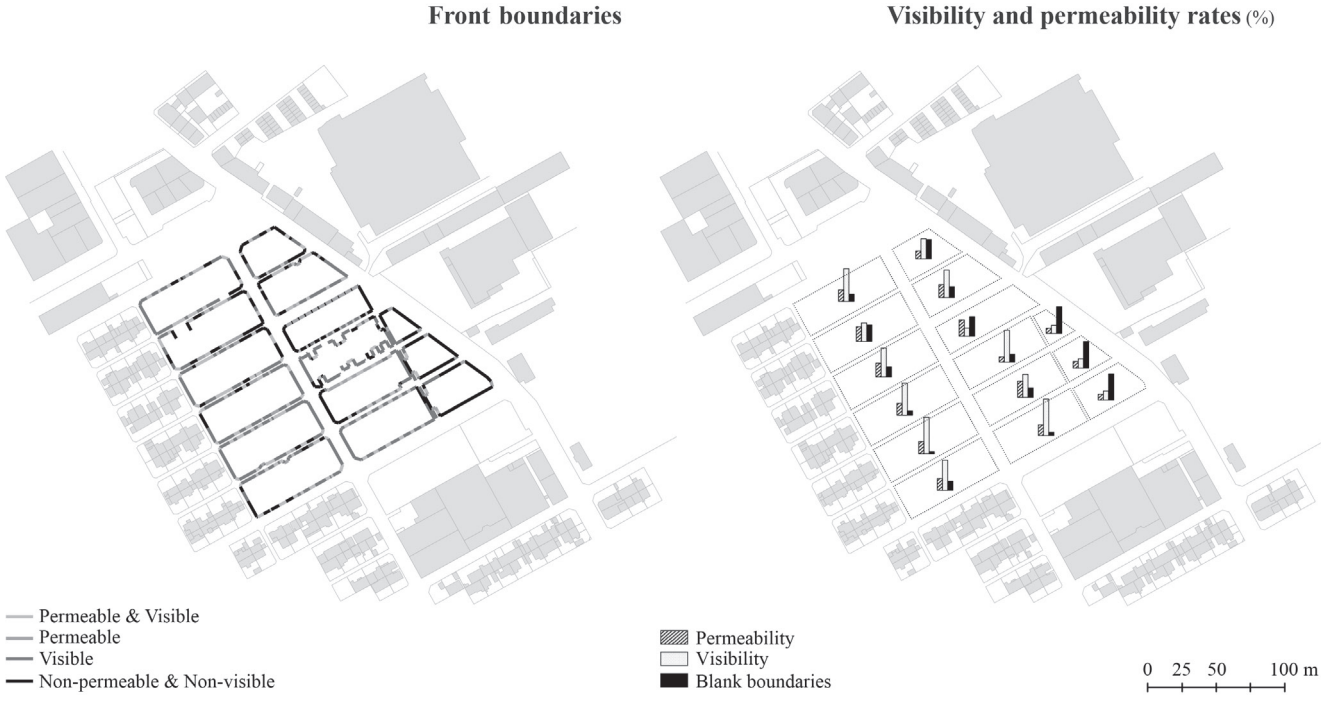


Figure 12. Left: Classification of front boundaries according to their degree of visibility (see through) and permeability (get through). Right: Visibility and permeability rates per block.

either have direct entrances or are entirely unconstituted. This finding is consistent with the very low occupancy and movement rates observed on site by the authors.

A second difference between the two cités is in the degree of visibility and permeability at ground level of front boundaries, such as walls or fences (Figure 12). A detailed recording of boundaries per block reveals a low performance of Cité Manifeste (permeability 24 per cent, visibility 45 per cent) in comparison to Cité Ouvrière (permeability 30 per cent, visibility 71 per cent). Cité Manifeste presents mixed results owing to differences between the five design typologies. What distorts the overall performance is mainly the designs of Nouvel and Poitevin & Reynaud, which have high percentages of blank boundaries. Basically these two designs make the façade of the cité towards rue Lavoisier a non-accessible, non-permeable and non-visible boundary. This impedes visual opportunities among inhabitants and strangers, and isolates the social life of Cité Manifeste from the street. Cité Ouvrière, the old cité, seems to be more visually exposed to pedestrians with mostly low see-through fences.

Physical and social integration at different scales: convergences and divergences

To assess further the impact of design on the physical and social integration of new social housing, the spatial and social performance of the two housing schemes, their design and evolution over time, was examined, giving further attention to the response of the newly, architect-designed Cité Manifeste relative to that of Cité Ouvrière.

Both cités have certain qualities inherent to their location that are responsible for an effective spatial performance at the city level. The new social housing scheme has benefited from the evolved integrated configuration of the old cité at both local and wider scales, providing greater preconditions for through- and to-movement. Its urban design has also respected the form of the surrounding street network, contributing to the performance of

the entire system locally. This confirms the importance of the context and its latent spatial potential for the physical integration and, consequently, the sustainability of new housing.

At the neighbourhood level, both cités were found to be conventional, outward-facing, street-based residential areas where little anti-social behaviour occurs. They present linear, inter-accessible streets flanked by houses, windows and doors on both sides, with high densities of residents, complemented by inter-visibility at the ground level. These spatial conditions in residential schemes have been associated with low rates of burglaries (Chiaradia and Trigueiro, 2005; Hillier, 2004; Hillier and Sahbaz, 2009; Shu, 1999), while creating beneficial social conditions for a doorstep culture and solidarity among neighbours.

At the level of the urban interface and the social culture created by it, none of the five Cité Manifeste designs entirely fulfilled the principles of the old housing scheme. However, not all of these designs seem to perform similarly. Some failed more than others to realize the enriched, multi-layered urban interface that Cité Ouvrière has gradually developed over the years. Nouvel's street block, for example, has the lowest spatial performance, owing to its lack of entrances on three sides, including the main street. Similarly, the Poitevin & Reynaud design has street frontages without entrances on the west and east sides. It also has an inward-looking façade to the north. The intermediate open spaces of the Lewis and Potin with Block design are rather confusing for the inhabitants to use, and the removal of main entrances from the ground level of Ban with de Gastines' street block discourages the extension of interior activities to the exterior space. In general, the interface of Cité Manifeste with the street is more inward-facing and enclosed than Cité Ouvrière.

A discrepancy is evident in the spatial performance and integration at different scales. At the city level, the two cités show similar characteristics, featuring high values of integration along their edges or main streets, as well as distinctive intensified street-block morphology. At the block/plot level, however, the first divergence appears. Cité Ouvrière has self-regulated its original design through a bottom-up adaptation process; each building has been densified and appropriated by its inhabitants to serve their growing needs over time. This process has been based on the principle of single plot-building compounds. In contrast, the design of Cité Manifeste has been found to be less flexible in its conception, development and management, as well as in its further growth at the level of whole street blocks. Differently from the old cité, where the housing and its evolution rely on the design of the individual building/plot, here the smallest unit of transformation is the individual street block that contains multiple buildings. It is true that changes in Cité Manifeste are either not allowed or subject to obtaining building permission from the architects and SOMCO. Nevertheless, even if they were allowed, they would be constrained by the size of the entire street block and the needs, preferences and capacities of the other 9 to 13 households within the street block. This affects greatly the capacity of houses to accommodate effectively adaptations of use and form over time, ensuring their long-term viability.

Conclusion

Not only have spatial, political and financial differences been observed between Cité Manifeste and Cité Ouvrière, but also between the first and subsequent two development phases of Cité Ouvrière (Jonas, 2003, p. 158). Cité Manifeste has been better integrated spatially than socially into Cité Ouvrière and its wider context. Its architectural and urban design fosters to a certain extent a social élitism that gives the impression of a cité within a cité. By distinguishing itself from the old quarter, Cité Manifeste has acted as an avant-garde social housing experiment that was built to make the area attractive again. As Miot (2013) puts it, the strategy of 'residential attractiveness' is nowadays common for regenerating shrinking cities like Mulhouse, which struggle to consolidate themselves after deindustrialization. In that sense, Cité

Manifeste served as an attractive feature for the entire city. The publicity that the venture received originally has created a residential product and an urban brand. Mulhouse needed to attract flows and different kinds of resources or population. This and other similar projects created an opportunity that would reduce the demographic losses and retain long-term entrants, giving Mulhouse a competitive edge again among other former industrial cities. While the main drive behind the construction of Cité Ouvrière was the social reform of the working class, the political agenda behind the new Cité Manifeste was to initiate a micro-territorial policy for reversing the decline of the entire city. The most important issues are whether and how these two approaches could be unified into a more effective and sustainable design framework for new housing schemes.

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References

Chiaradia, A. and Triguiero, E. (2005) 'Towards an interface index', in van Nes, A. (ed.) *Proceedings of the 5th International Space Syntax Symposium* (TU Delft, Delft) 811–12.

Crawford, K., Johnson, C., Davies, F., Joo, S. and Bell, S. (2014) *Demolition or refurbishment of social housing? A review of the evidence* (UCL Urban Lab and Engineering Exchange for Just Space and the London Tenants Federation, London).

Demolins, E. (1881) 'Les habitations ouvrières', *La Reforme Sociale* 1, 301–6.

Ermenc, J. J. (1957) 'Avant-garde capitalism in France', *The French Review* 31, 129–35.

Franzèn, M. (2009) 'Matters of urban segregation', in Koch, D., Marcus, L. and Steen, J. (eds) *Proceedings of the 7th International Space Syntax Symposium* (KTH Stockholm, Stockholm) I05, 1–2.

Garner, J. S. (1992) 'Noisel-sur-Marne and the ville industrielle in France', in Garner, J. S. (ed.) *The company town: architecture and society in the early industrial age* (Oxford University Press, New York) 43–74.

Gromark, S. (2008) 'Visions of residential futures – spatial advention as creative catalyst. The case of Cité Manifeste in Mulhouse 2005. Renewed approaches to research and design strategies', unpublished paper presented to the Formas Architectural Inquiries Conference, Göteborg, April.

Guth, S., Léger, J-M. and Trivière, F-X. (2013) *Analyse-évaluation La Cité Manifeste à Mulhouse* (MEDDTL – DGALN/Plan Urbanisme Construction Architecture BATEX II and Institut Parisien de Recherche, Architecture Urbanistique et Sociétés, Laboratoire de Recherche de l'ENSA Paris-Belleville).

Hanson, J. (1998) *Decoding homes and houses* (Cambridge University Press, Cambridge).

Hanson, J. (2000) 'Urban transformations: a history of design ideas', *Urban Design International* 5, 97–122.

Hanson, J. and Zako, R. (2007) 'Communities of co-presence and surveillance: how public open space shapes awareness and behaviour in residential developments', in Kubat, A. S., Ertekin, Ö., Güney, Y. İ. and Eyüboğlu, E. (eds) *Proceedings of the 6th International Space Syntax Symposium* (Istanbul Technical Univesity, Istanbul) 021: 01–22.

Hillier, B. (1973) 'In defence of space', *RIBA Journal* November, 539–43.

Hillier, B. (1988) *Against enclosure* (Butterworth, London).

Hillier, B. (2004) 'Can streets be made safe?', *Urban Design International* 9, 31–45.

Hillier, B. and Hanson, J. (1984) *The social logic of space* (Cambridge University Press, Cambridge).

Hillier, B. and Hanson, J. (1987) 'The architecture of community: some new proposals on the social consequences of architectural and planning decisions', *Architecture et Comportement/ Architecture and Behaviour* 3, 251–73.

Hillier, B., Burdett, R., Peponis, J. and Penn, A. (1987) 'Creating life: or does archi-

tecture determine anything?', *Architecture et Comportement/Architecture and Behaviour* 3, 233–50.

Hillier, B., Penn, A. and Dalton, N. (1992) 'Milton Keynes: looking back to London', *The Architects Journal* 15 April.

Hillier, B. and Sabhaz, O. (2009) 'An evidence based approach to crime and urban design', in Cooper, R., Evans, G. and Boyko, C. (eds) *Designing sustainable cities: decision-making tools and resources for design* (Wiley-Blackwell, Chichester) 163–86.

Jacobs, J. (1961) *The life and death of great American cities* (Random House, New York).

Jonas, S. (2003) Mulhouse et ses cités ouvrières: perspective historique; 1840–1918; quatre-vingt ans d'histoire urbaine et sociale du logement ouvrier d'origine industrielle (Oberlin, Strasbourg).

Kostourou, F. (2015) 'Configurational and morphological sustainability in social housing: the case of Cité Ouvrière in Mulhouse', in Karimi, K., Vaughan, L., Sailer, K., Palaiologou, G. and Bolton, T. (eds) *Proceedings of the 10th International Space Syntax Symposium* (UCL, London) 7: 1–20.

Kropf, K. S. (2001) 'Conceptions of change in the built environment', *Urban Morphology* 5, 29–46.

Legeby, A. (2009) 'Accessibility and urban life: aspects on social segregation', in Koch, D., Marcus, L. and Steen, J. (eds) *Proceedings of the 7th International Space Syntax Symposium* (KTH Stockholm, Stockholm) 064: 1–11.

Miot, Y. (2013) 'Residential awareness as a public policy goal for declining industrial cities: housing renewal strategies in Mulhouse, Roubaix and Saint-Etienne (France)', *European Planning Studies* 23, 104–25.

Motloch, J. L. (1991) *Introduction to landscape design* (Van Nostrand Reinhold, New York).

Moudon, A. V. (1986) *Built for change: neighborhood architecture in San Francisco* (MIT Press, Cambridge, MA).

Muller, E. and Cacheux, E. (1889) *Les habitations ouvrières en tous pays* 2nd edn (Baudry & Cie, Paris).

Newman, O. (1972) *Defensible space* (Macmillan, New York).

Palaiologou, G. and Kostourou, F. (2016) 'Long-term challenges in urban housing: in the search for intersections between design and policy regulations', in Day, K. (ed.) *Future housing: global cities and regional problems* AMPS Conference Publication Series 7 (Swinburne University, Melbourne) 39–58.

Palaiologou, G. and Vaughan, L. (2012) 'Urban rhythms: historic housing evolution and socio-spatial boundaries', in Greene, M., Reyes, J. and Castro, A. (eds) *Proceedings of the 8th International Space Syntax Symposium* (Pontificia Universidad Católica de Chile, Santiago) 8161: 1–21.

Peach, C. (1996) 'Good segregation, bad segregation', *Planning Perspectives* 11, 379–98.

Penot, A. (1867) *Les cités ouvrières de Mulhouse et du department du Haut-Rhin* (L. L. Bader & Eugène Lacroix, Paris).

Porteous, J. D. (1970) 'The nature of the company town', *Transactions of the Institute of British Geographers* 51, 127–42.

Power, A. (2008) 'Does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability?', *Energy Policy* 36, 4487–501.

Power, A. (2010) 'Housing and sustainability: demolition or refurbishment?', *Proceedings of the ICE-Urban Design and Planning* 163, 205–16.

Shapiro, A-L. (1982) 'Housing reform in Paris: social space and social control', *French Historical Studies* 12, 486–507.

Shu, S. C-F. (1999) 'Housing layout and crime vulnerability', in Major, M.D. and Amorim, L. (eds) *Proceedings of the 2nd International Space Syntax Symposium* (Universidade de Brasilia, Brasilia) 01: 1–12.

Steadman, P. (1983) *Architectural morphology: an introduction to the geometry of building plans* (Pion, London).

Trélat, E. (1880) 'Cités ouvrières, maisons ouvrières', *Exposition Universelle Internationale de 1878 à Paris: Comptes-rendus sténographiques. Congrès international d'hygiène tenu à Paris du 1 er au 10 août 1878* Tome I. Organisation du congrès. Séance plénières au Palais du Trocadero, Paris, 538–52 (http://cnum.cnam.fr/C/GI/redira.cgi?8XAE245.2).

Vaughan, L. (2005) 'The relationship between physical segregation and social marginalisation in the urban environment', *World Architecture* 185, 88–96.

Vaughan, L. and Hillier, B. (2007) 'The spatial syntax of urban segregation', *Progress in Planning* 67, 205–94.

Zako, R. and Hanson, J. (2009) 'Housing in the twentieth century city', in Cooper, R., Evans, G. and Boyko, C. (eds) *Designing sustainable cities: decision-making tools and resources for design* (Wiley-Blackwell, Chichester) 112–38.