

LONG-TERM CHALLENGES IN URBAN HOUSING: IN THE SEARCH FOR INTERSECTIONS BETWEEN DESIGN AND POLICY REGULATIONS

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INTRODUCTION

In the contemporary urban context, cities under pressure are called to overcome, foresee and manage the impossible: continuously increasing challenges which reside under the greater label of sustainability and entail resolving environmental, social, economic and cultural problems¹. The scale and speed of change cities undergo, compromises the extents to which provided solutions display well-estimated chances for long-term viability. In other words, while longevity is by definition linked to sustainability, very often it remains neglected by urban vision agendas. On all urban grounds, old and emerging, designers and policy makers are dealing with multifaceted projects of either developing, reinventing or conserving the city. Now, more than ever, the debate on modes of living, on what is to be built, reconfigured or protected, renders itself critical and, as ever, it manifests extensively in the issue of housing. From the UK housing crisis to new towns like Rawabi in Palestine, it appears unavoidable that the debate on the future of urban housing falls into the loops of planning systems, development constraints and the real estate market.

Expanding on Booth's study² of Anglo-American, French and Hong-Kong planning systems, John Punter discusses how most of the twentieth century cities have been associated with two different planning systems³. On one side was the regulatory system of North America and most Western Europe, which was based on clear development rights, zoning regulations, administrative laws and a written constitution. On the other side was the discretionary system of Britain and Ireland where decision-making was plan-based yet susceptible to alterations. While design policy was clearly prescribed in the former, in the latter it was rather flexible; still, the approaches often converged⁴. At the same time, the twentieth century cities have failed to address housing sustainability successfully, with the collapsed utopias of modernism and post-modernism considered as their most characteristic failures. In the premises of reassessing future projections for a sustainable urbanism, urban design theory and research focused on examining what went wrong. As Marshall⁵ briefly reviews it, the modernist rational thinking in planning, projected mainly onto the design of 30s-70s housing estates, formed a 'disurbanism'⁶ of segregated morphologies. Then, debates on what constitutes 'good urbanism'⁷ suggested that the essence of city lies in the density and diversity of street activity⁸, implying the significance of socio-economic sustainability as an integral property of a well-functioning city⁹. However, while architecture and urban design literature¹⁰ has extensively studied disurbanism and good urbanism, the focus has stayed solely on the interplay between spatial, social, political and economical evidence. Instead, few studies of the field have looked at the 'urban design as public policy'¹¹; the design principles¹² and review practices¹³; or the building/planning regulations¹⁴ in relation to urban housing. Even fewer have addressed policymaking at different levels of the city

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scale¹⁵ and across a long-term period of evolution of the built environment. This evidence further demonstrates the need to understand the role of design and policymaking on shaping the complexities of the quotidian city over time; and in particular, the regulatory dynamics from macro to micro scales responsible for the housing cultures of the twentieth century cities.






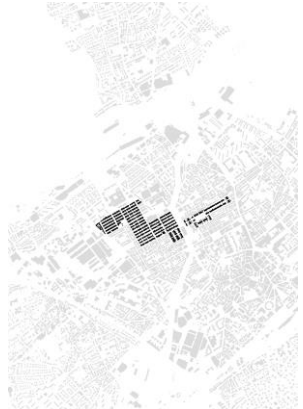
Case Studies	West Village	Islington	Cité Ouvrière
Date	1790-1835	1900-1930	1853-1897
Housing Type	Federal Row	Georgian and Victorian Terraced Houses	Terraced Back-to-Back Quarter-detached Semi-detached
Urban Type	Old city part (urban)	Satellite town (suburban)	Company town (Working-class mass housing)
Diachronic Process	Accommodation of non-residential uses	Block treatment / Subdivision	Incremental growth
City & Housing			
Housing Figure ground			

Figure 1. Summary of case studies

This paper looks at long-standing housing schemes, which remain spatially and socio-economically relevant to the context of the contemporary city, showing a consistent ability to resist, adapt and change in response to unforeseeable needs and pressures. We use an analytical, evidence-based approach, which merges methods and tools from the historico-geographical, the process-typological and the space syntax schools of urban morphology¹⁶. We examine three case studies: the West Village in Manhattan; Islington in London; and Cité Ouvrière in Mulhouse. These were selected to reflect varying urbanisation challenges in different contexts – in terms of spatial, morphological, socio-economic and cultural conditions – and in each case we focus on the policymaking approaches, which have had a significant impact on the way these urban places evolved over time. Figure 1 summarises the background and relevant particularities that each case study deals with. The comparison of the three case studies suggests that a combination of policies at different levels have been successful in each case to ensure the long-term viability of the building stock. It does, however, acknowledge that local communities have also been instrumental in supporting the formation of appropriate planning policies.

EXCESSIVE URBANITIES: EMBEDDING DIVERSITY

Case study: The West Village, Manhattan

The West Village is one of the oldest parts of New York and today retains possibly the greatest assortment of row houses dating from 1790-1835 (Federal style). The first blocks were delineated as early as 1752¹⁷. The street grid followed the direction of main thoroughfares, as well as the boundaries of existing land ownership, which resulted in great variation in terms of block sizes and shapes¹⁸. Other than fire regulations (state laws of 1775¹⁹ and 1791²⁰), the design of these buildings was neither extensively regulated nor necessarily overseen by architects. Instead, Federal row houses were built following builders' guides and *in situ* craftsmanship²¹ until 1806, when the first official requirement²² for scientific engineering guidance in housing design was introduced.

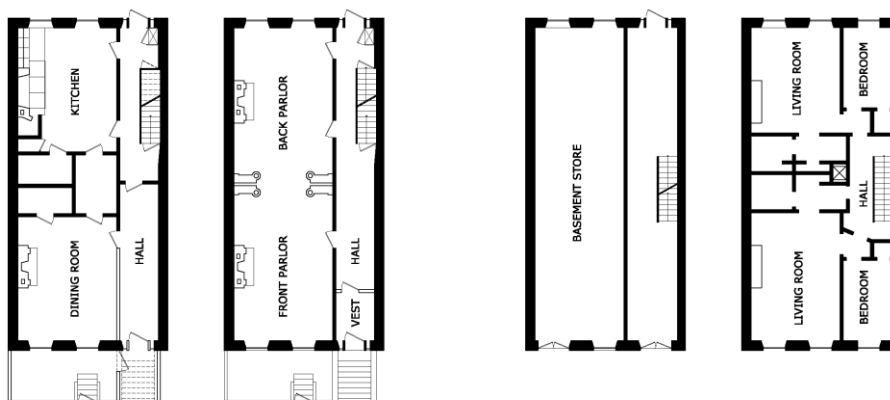


Figure 2. A typical Federal row house plan; before (1890s) and after (1920s) alteration.
Reproduced from Andrew S. Dolkart, *The Row House Reborn* (2009, p.31).

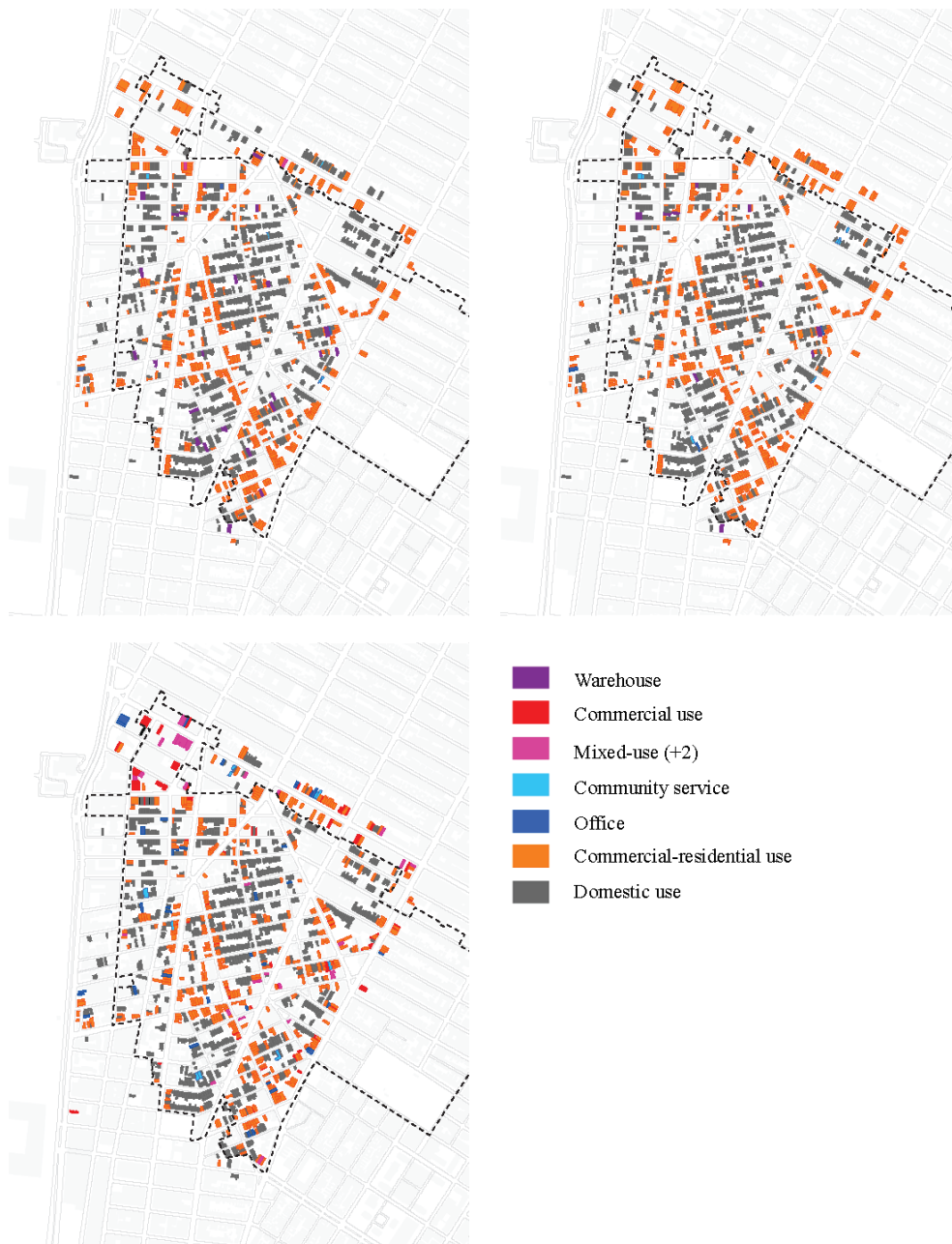


Figure 3. The West Village, Manhattan – building use record for row houses and old-law tenements (top left: 1921, top right: 1955, down left: 2011). The land uses visualise the time-spread 'ballet of Hudson Street' and mixing of uses as described by Jane Jacobs (1961, p. 153). Background map: © 2011 Department of Information Technology and Telecommunications, NYC.

The 1820s and 1830s rapid urban expansion in Manhattan absorbed the Village, turning it into a 'boom town'²³. By the end of nineteenth century, row house conversion to multiple flats was becoming the norm²⁴, while tenement developers were taking over the blocks at the southern end of the Village, in response to a demand for higher density housing²⁵. The refurbishment of row houses

often included changes in building use with stores accommodated on the ground or lower-ground floor (Figure 2). The culture of construction along with technological innovation²⁶, as well as the block configuration with narrow plots in combination with the flexible, symmetrical building interior layout²⁷ allowed for row houses to adapt to urban change (Figure 3). The varying adaptations of the row house typology resulted in both the maintenance of picturesque qualities and the formation of a lively streetscape accommodating in the urban block diverse uses in high density and close proximity to each other. To the mixing of uses contributed the area's street layout properties²⁸, as revealed by space syntax analysis (Figure 4): (1) long, straight, north-south axes turned the Village into a passing through, well-connected area; (2) short block-fronts enhanced local permeability and socio-economic activity; and (3) longer block-fronts on the east-west direction protected the residential quieter streets.



Figure 4. The West Village, Manhattan – spatial accessibility 2500m (using the space syntax measure of combined integration and choice).

The case of the West Village is an example of community participation in policy making. A number of local groups and associations were active in the Village, establishing their role in affecting legislation. The Greenwich Village Improvement Society, founded in 1903 by Mary Simkhovitch was one of the first neighbourhood associations in New York City²⁹. In 1906 active residents established the Washington Square Association, another local organisation which aimed to protect the residential

character of the area. The Central Mercantile Association represented the interests of local merchants. These social and commercial parties, in liaison with real estate developers with interests in the area, promoted neighbourhood activism and influenced over the years political actions in favour of safeguarding the future of the Village³⁰. Effectively, the 1916 Zoning Commission regulation, echoing the voices of local representations³¹, provisioned restrictions on residential and commercial uses in the heart of the neighbourhood³² and at the same time protected manufacturing (light industrial) uses in the west waterfront area. Later in 1961, Jane Jacobs's activism against the West Village Houses renewal project³³ proposed by the New York City Housing and Redevelopment Board (HBR), forced the HBR to drop their mono-functional 'slum' clearance scheme and the Committee to Save the West Village, formed in 1963, submitted its own redevelopment plan. Notably, Jacobs's attacks³⁴ on urban renewal policies resulted in the historic preservation of the Village in 1969, designated by the Landmarks Preservation Commission. Since then, the Greenwich Village Society for Historic Preservation (GVSHP), a non-profit organisation founded in 1980, has led more than 70 campaigns³⁵ and has succeeded in passing zoning proposals in 2005³⁶ and 2010³⁷ for density and height restrictions in the West Village.

EXPANDING CITY: PROTECTING PLACES

Case study: Islington, London

Islington was first known as a dormitory village (mid-sixteenth century), north of London. The area gradually grew out as a suburban retreat settlement³⁸. During the first three decades of the nineteenth century, villas and terraced houses started occupying the fields of Canonbury and Barnsbury. Non-domestic activity clustered alongside Upper and Lower Streets – the two historical roads of the area. By the turn of twentieth century Islington was a satellite town³⁹ in its own right, with transportation links to and from the city centre intensifying the appeal of the suburb to commuters. In the meantime, London was expanding towards its fringes. The city soon reached Islington and brought new settlers in the area. The requirements for new housing space led to the subdivision of single-family terraced houses into multi-dwellings, and eventually to overcrowding.

Whilst similar to the row house typology and equally flexible in terms of floor layout, here the individual terraced house was more submissive to the architectural and morphological unity of the entire block front. Changes in built form and/or occupancy were more likely to affect the whole terrace rather than a single building unit (Figure 5). Among the regulations affecting the terrace built form were those dealing with matters of fire prevention⁴⁰, sanitation, lighting, ventilation and drainage⁴¹ with an impact on the width of streets, as well as the width, height and materials of buildings. The unity of the terrace at the block-front scale⁴², as well as the functional distinction between prominent spatially integrated streets and quieter, primarily residential streets⁴³ (Figure 6), created over time sections within Islington with diverse qualities and different character, ranging from purely residential to highly mixed use.

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Figure 5. Chapel Street, Islington, London – historical building footprints showing terraced house transformations, from top to down: 1875, 1910, 1965, 2013. Historical and background maps: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service.



Figure 6. Islington, London – spatial accessibility 2500m (using the space syntax measure of combined integration and choice).

To protect the character of the area, in 1969 the Council of Islington Borough designated the first of a series of urban conservation areas that followed. Adopting an approach to conservation, which acknowledges that built form itself is not the sole factor defining an area's character. Street layout, components of the streets' micromorphology⁴⁴, building uses and their mixture, as well as the intermingling of private and public spaces, are all considered as parameters that have an impact on the identity of urban sceneries. There are seven conservation areas falling partly or wholly within the case study boundary, with all areas having been designated at different points in time.

The gradual embedding of Islington into the entire London movement network also shifted a once-suburban village to a local sub-centre. Analysis showed that those conservation areas while fragmentally delineated, were found to respond to physical, spatial and socio-economic characteristics as these naturally evolved throughout London's urbanisation processes. Non-domestic activity settled down along the main streets and on those districts, which historically showed higher street network accessibility potential (Figure 7). Overall, it is of interest to note how the Borough's localised approach chose the unit of 'clusters' instead of 'housing blocks/buildings' in order to safeguard the character of these places at the meso level, and managed to embed emerging socio-spatial processes of the past in the policy-making schemes, which regulated the future of these conservation areas.

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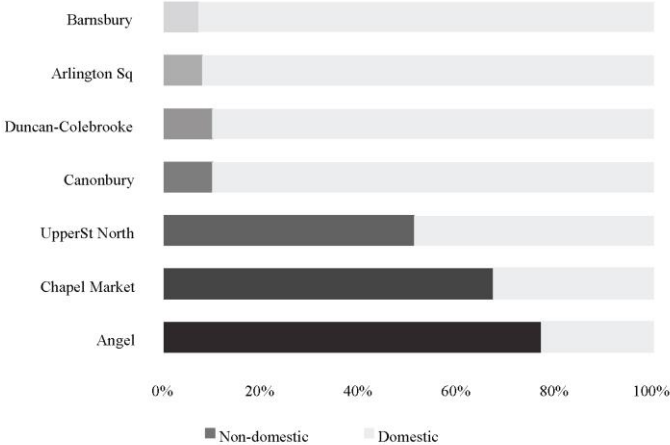
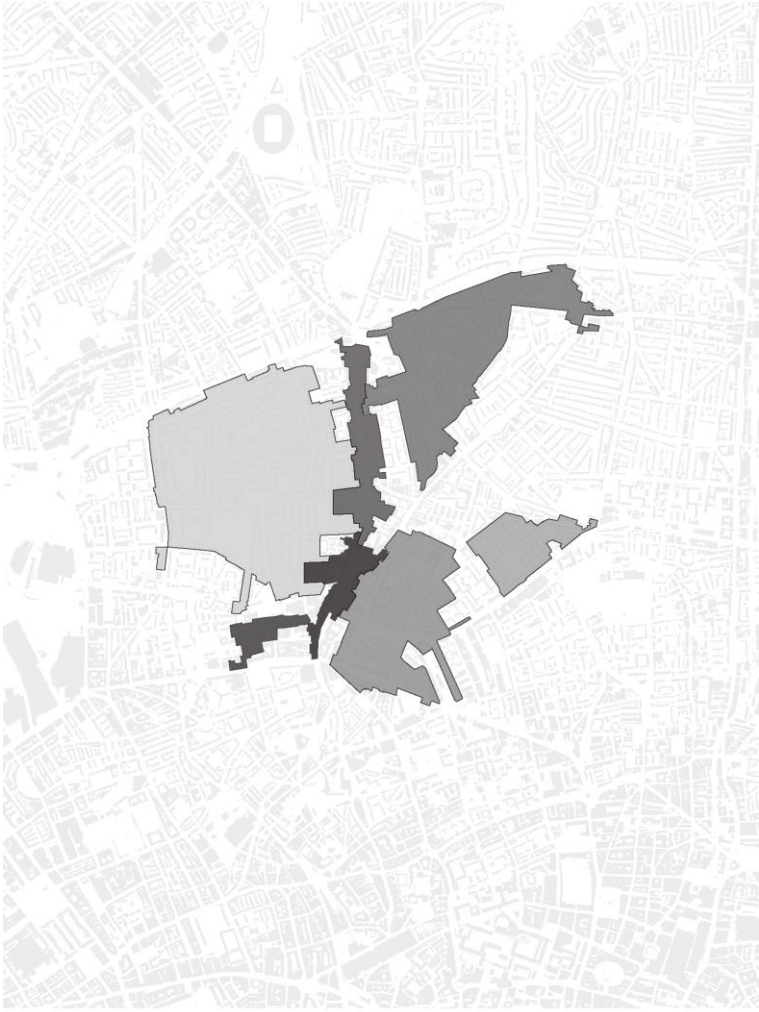


Figure 7. Islington, London – conservation areas; showing the areas’ average value of spatial accessibility and the percentages of domestic vs. non-domestic uses. Background map: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service.

SOCIAL HOUSING PROJECT: REGULATING ADAPTABILITY

Case study: Cité Ouvrière, Mulhouse

Cité Ouvrière in Mulhouse was built as a low-cost mass-housing scheme realised by the industrialists of Société Mulhousienne des Cités Ouvrières (SOMCO) for the workers of the Dollfus, Mieg & Cie (DMC) textile factory. The construction began in 1853 at the north edge of the city next to where the factory was located. It lasted till 1897 counting at the end a sum of 1243 single-family dwellings homogeneously repeated in space (Figure 8). It was developed in three time periods eventually demonstrating three main building types: (1) terraced, (2) back-to-back⁴⁵, and (3) quarter-detached houses. All types were symmetric, low-rise (two floors plus an attic) with pitched roofs and private gardens. The overall plan was based on an orthogonal and hierarchical – according to street width – urban grid with some narrow passages of 2,5 meters.

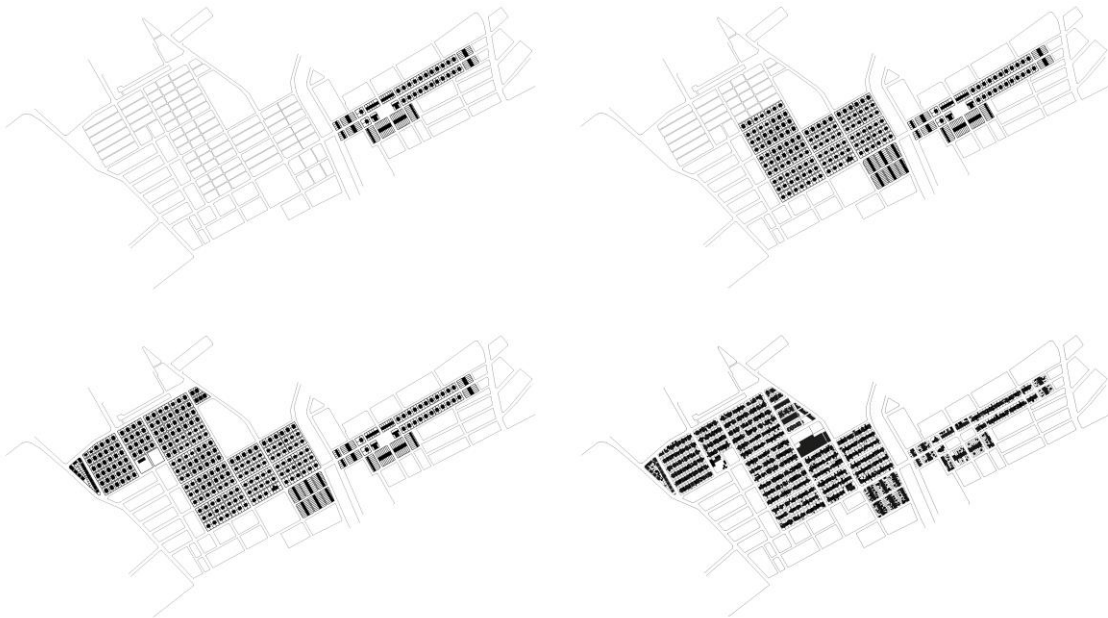


Figure 8. Cité Ouvrière in Mulhouse – development phases from top left to bottom right: 1853, 1856-1870, 1876-1897, 2015. Maps produced based on historical maps and maps provided by © 2012 IGN Copyright Institut National de l'Information Géographique et Forestière

Cité Ouvrière was not a typical ‘company town’⁴⁶; not only because of its architecture and urban design, but also because of the cultural and social aspirations for the labour, the access to property ownership and social mobility. It is also the first French case where government funds were used for a private project as far as public infrastructure and communal services were concerned⁴⁷. Few non-residential uses were also provided or opened such as nursery school, public baths, clothing stores, bistros, restaurants, bakery and laundries. In fact, scholars⁴⁸ have highlighted its catalytic influence on the following European company towns and other working class housing.

This is the reason why since 1882 the Police du Bâtiment established a set of regulations for building permissions and later in 1910, these regulations advocated in favour of the conservation of the appearance of the Cité⁴⁹. Upon recognition of its urban and cultural value, as well as that of the surrounding industrial building stock, more recently the ’93 Projet Urbain Mulhousien⁵⁰ proposed the

protection of its architectural heritage (Figure 9). It also suggested the need for (1) the adaptation of housing to contemporary necessities within the framework of the first Opération programmée d'amélioration de l'habitat (OPAH), (2) the accommodation of new land uses in existing brownfields and (3) the association of housing with other activities. Accordingly, the zoning of '95 Plan d'Occupation des Sols⁵¹ (POS) published by the Service d'Urbanisme identified Cité Ouvrière as a UP3 zone, meaning a zone of urban patrimony, the coherence of which should be guaranteed by regulating any transformation, demolition or construction within the area.

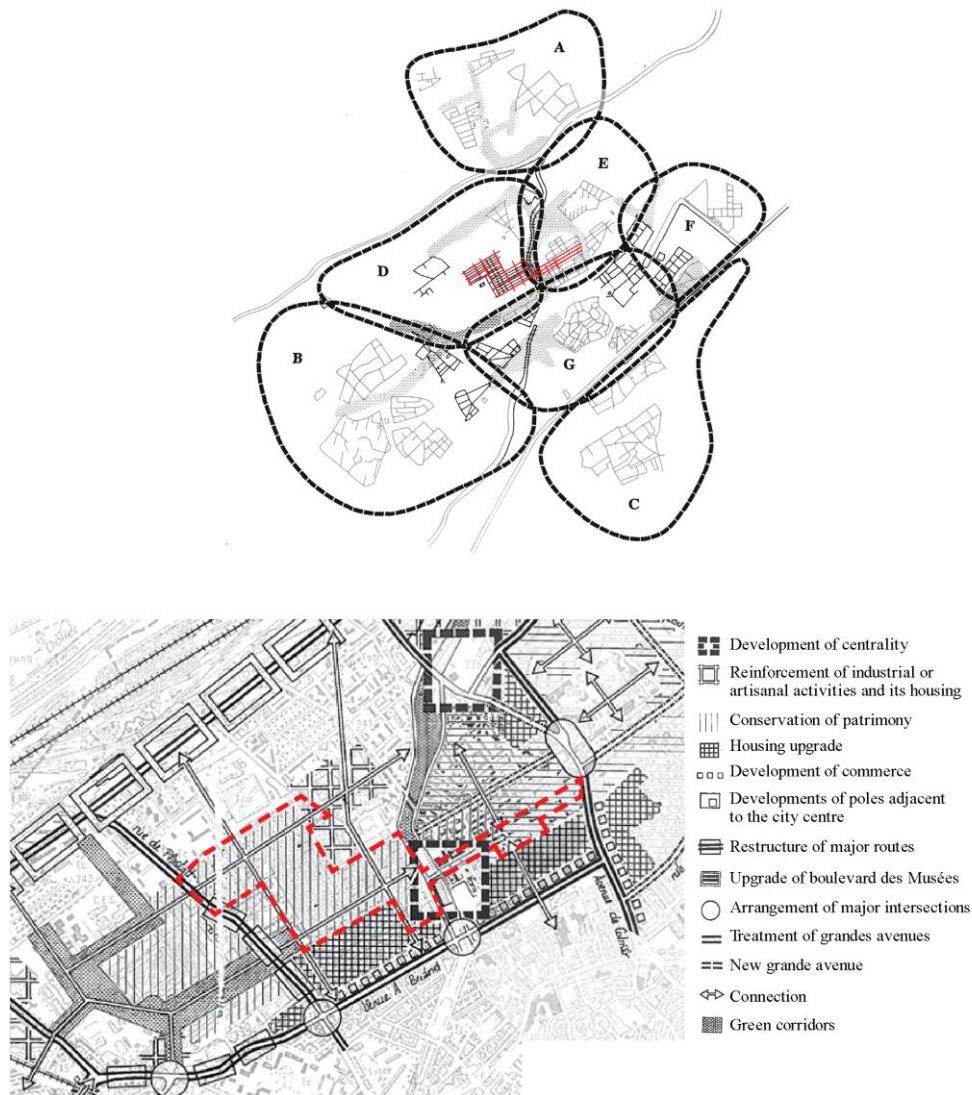


Figure 9. '93 Projet Urbain Mulhousien – Top: Urban strategies for each quarter. Cité Ouvrière is shared by D and E strategic areas concerning the upgrade of housing (E) and its association with other activities (D). Down: Detailed urban strategy for the cité. Two different maps have been joined together by the authors.

Source Chambaud, L. Vidal P. and Berger F., *Le Projet Urbain Mulhousien*, Bulletin de la Société Industrielle de Mulhouse. Mulhouse: Société Industrielle de Mulhouse, 2003.

While retrospectively, policymaking at the macro scale tried to enhance and protect the old quarter inasmuch as affiliating it with the modern city, Cité Ouvrière had already largely changed soon

after its completion. Vertical and horizontal extensions, subdivisions and annexations of the individual houses ruptured the architectural uniformity (Figure 10). Building permissions for these acts of changes were susceptible to a number of prescriptions with regard to implantation, aesthetics, security, fire prevention, heating, ventilation, hygiene, sanitation, street network and various others.⁵²

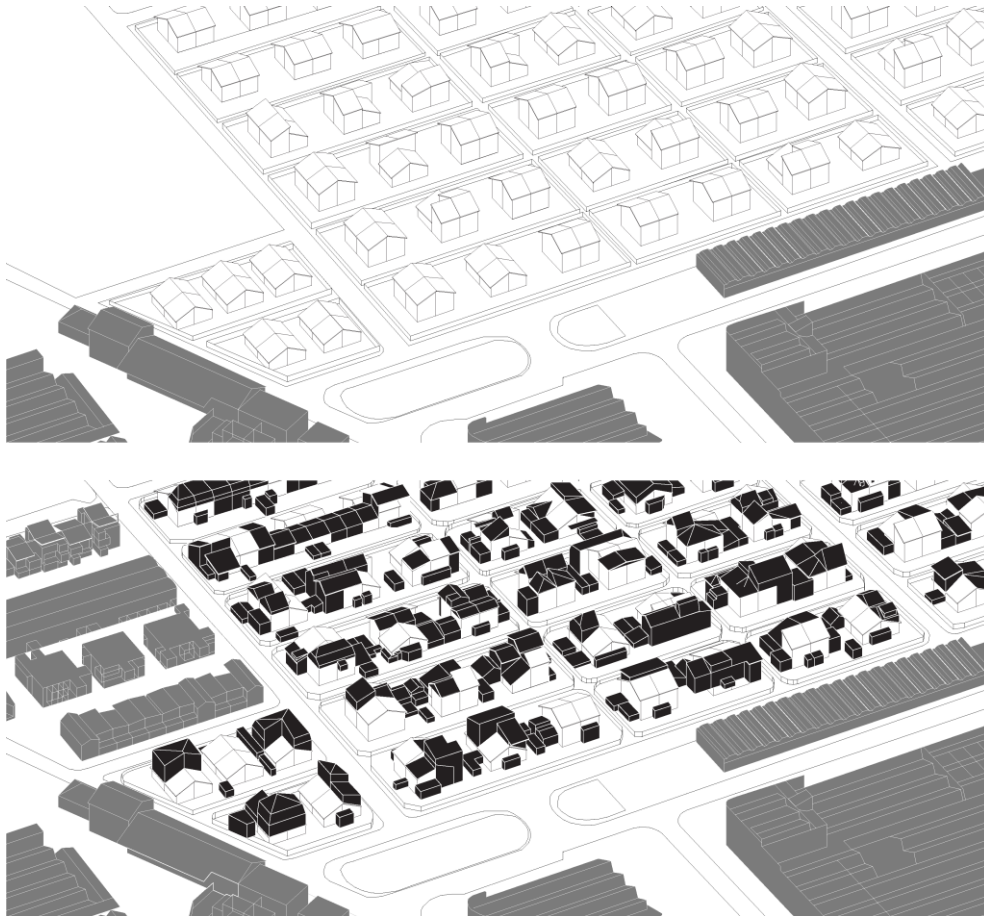


Figure 10. north-east part of Cité Ouvrière – axonometric by authors produced based on Bing Maps Bird's eye view.

To relate policymaking to the housing design now, the architect responsible for the cité Emile Muller deliberately provided open space more than 70% of the total plot area in all the original building types. This was believed to offer sanitary conditions, add value to the property and correspond to the social standards of family living. In fact, city authorities until before WWII aligned the building line permit with the building rather than with the plot so as to ensure that this open space remains unbuilt and gardens are safeguarded. However, with the introduction of the car from the beginning of twentieth century and the restoration wave after the war, the mushrooming of garage sheds and the re-arrangement of plots with clipped-off angles were observed (Figure 11). Effectively, the provision of such space added to the adaptive capacity of the housing typologies⁵³. Interestingly enough, transformations were not random, but followed morphological patterns over time mostly based on lifestyle trends and technological advancements.

Shifting to the actual built form, the '95 POS included a set of guidelines for future transformations in order to preserve the original character and architecture of Cité Ouvrière. Although

there was certain flexibility, regulations determined building volume, roof ensemble, dormer-windows, tiles and sewage pipes system, facades' composition, setbacks and fencing. Even more detailed guidelines were found in the Plan Local d'Urbanisme⁵⁴ (PLU) for the UP3 zone. Among other things, they included rules for land uses, networks' usage, modifications, distances and dimensions, structural elements, colours, styles, materials, decoration, garages and green spaces (Figure 12).

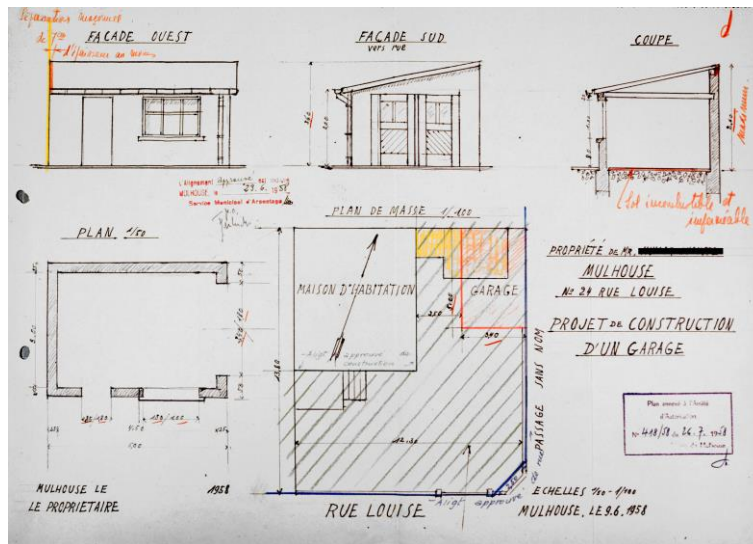


Figure 11. Plans for a garage shed and clipped-off angle plot submitted for Permis de Construire in 1958. Source: Service des Archives, Mulhouse.

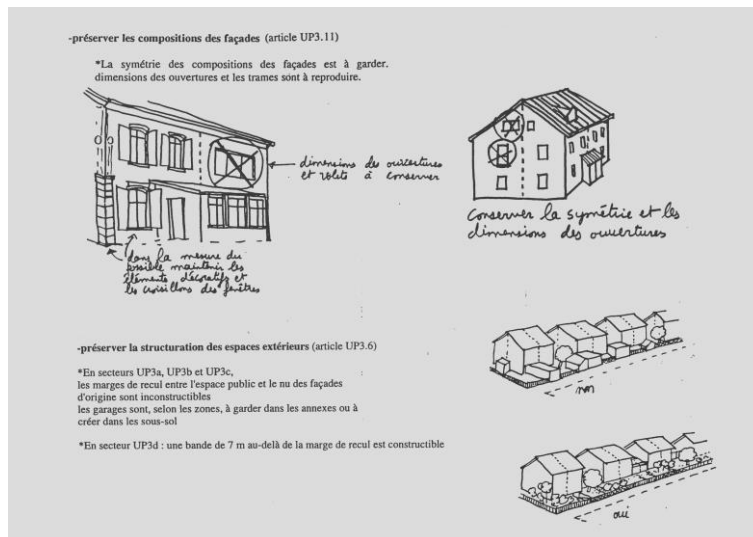


Figure 12. Building guidelines for UP3 zone. Source: Service d'Urbanisme. (1995). Plan d'Occupation des Sols, p. 29

Cité Ouvrière is a social housing project, which managed to preserve its character as a residential neighbourhood of multiple ethnicities and low-income population groups. This is partially explained by the fact that the original scheme carried inherent spatial qualities that enabled it to sustain any socio-economic upheavals and survive the fast-urbanisation process. Space syntax research⁵⁵ showed how the layout of Cité Ouvrière avoided deprivation as it was well embedded in the global and local movement networks and its intensified grid of short and dense blocks made it internally easily accessible, while being surrounded by inter-accessible streets that attract non-residential activities (Figure 13). However, this would not have been the case if policymaking had not managed to regulate incremental growth without discouraging it. Cité Ouvrière now embodies both (1) formal unity – yet not uniformity – thanks to its original underlying organisational rhythm⁵⁶, and (2) formal variety as a result of a series of morphological transformations and the consistency of their patterns.



Figure 13. Cité Ouvrière, Mulhouse – spatial accessibility global scale (using the space syntax measure of integration).

CONCLUSION

This paper discussed design policies in relation to urban transformations mostly throughout the twentieth century in the context of three particular residential schemes in North America, Britain and France. The objective was to frame the impact of regulations on the evolution of housing as well as identify the different operational levels of policymaking in the city shaping process.

Collectively, we observed that the national, departmental, municipal and local regulations as fragmented as they may seem, they actually produce a framework of legal ‘affordance’⁵⁷, which up to a great extent formulates the possibilities of housing for long-term viability. In all the three case studies and planning systems a degree of flexibility was observed which enabled the evolution of the domestic building stock. Particularly, in the cases of West Village and Cité Ouvrière, flexible policies were happening simultaneously with local transformations of the houses – occasionally later – as a result of technological advancements and societal changes. Nonetheless, under this framework, housing schemes managed to evolve and grow whilst maintaining integrity over time and without missing the balance between stability, continuity and change⁵⁸.

Case Studies	West Village	Islington	Cité Ouvrière
Date	1790-1835	1900-1930	1853-1897
Characteristics	Mixed-use Diversity Historic Preservation	Clusters of uses Unity Historic Conservation	Purely residential Ruptured uniformity Industrial Heritage
Planning System (macro)	Regulatory	Discretionary	Regulatory
Development Constraints (meso)	Zoning Commission / State Laws	Conservation areas	Local Masterplan PLU / Zoning POS / Planning Codes
Local stakeholders (micro)	Community participation	Authority of local council	Regulated bottom-up transformations

Figure 14. Summary of findings

Furthermore, we argue that the management of policymaking over time happened at different levels, at different speeds and by different stakeholders within the same schemes. For instance at the macro scale, the West Village struck the right balance between the need for state legislation on the one hand and community’s control through active participation on the other; namely the combination of top-down and bottom-up policymaking. Then, at the meso scale, what prevailed in all cases was the

management of decision-making by users and local stakeholders. By ensuring that the various stakeholders take decisions across different built scales and a variety of conditions occur in space at different times⁵⁹, long-term sustainability is ensured. At the micro level, processes of transformations allowed for morphological diversity to emerge, while keeping the principles of the architectural identity and character of the place intact. Particularly, in the West Village and Cité Ouvrière the original standardised uniformity gradually evolved to unity due to the combination of design possibilities and policymaking at different levels: that of buildings, plots, blocks, city parts and city wholes.

On a final note, we wish to highlight how all three case studies showed inherent physical and spatial qualities, which supported their longevity. The local morphological conditions of buildings, plots and blocks enabled the piecemeal change of the built form as new demands, restrictions and potentials were arising. Space syntax analysis showed how the spatial layout of streets, being integrated with the surrounding city, ensured the areas' accessibility to urban flows, resources and networks. In other words, in all three cases policymaking benefited from the given potential of flexible built forms and integrated into the city street networks. Notably, this suggests the interdependence of architectural and spatial design and urban housing governance over time and calls for a synergetic relationship between them in every step and scale of policymaking.

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- ²⁵ Legislation at the time revolved around the 'tenement problem' looking for designs, which would reduce the effects of overcrowding by securing air and ventilation. Estate developers managed to use the *New Tenement Law* to their profit by remodeling the row-house interiors into flats with kitchen facilities masked as 'non-housekeeping' studios with 'dressing rooms'. See Andrew S. Dolkart, *The Row House reborn* (Baltimore: The John Hopkins University Press, 2009), 167.
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- ³⁰ Andrew S. Dolkart, *The Row House reborn* (Baltimore: The John Hopkins University Press, 2009), 116-119.
- ³¹ c.f. 'City buildings zones divide realty men', taken from the New York Times archive: <http://query.nytimes.com/mem/archive-free/pdf?res=9E07E4D71231E733A0575BC2A9659C946796D6CF> (accessed May 30 2016).
- ³² Caroline Ware, *Greenwich Village, 1920-1930: A Comment on American Civilization in the Post-War Years* (New York: Harper and Row, 1965; First edition in 1935, Boston: Houghton Mifflin), 14.
- ³³ Richard Plunz, *A History of Housing in New York City* (New York: Columbia University Press, 1999), 308-312.
- ³⁴ See in *ibid.*, an example of Jacobs's activism against the West Village Houses renewal project proposed by the New York City Housing and Redevelopment Board (HBR) in 1961. After long debates the HBR dropped the proposal and the Committee to Save the West Village, formed in 1963, submitted its own redevelopment plan.
- ³⁵ <http://www.gvshp.org/gvshp/preservation/index.htm> (accessed May 30 2016)
- ³⁶ <http://www1.nyc.gov/assets/planning/download/pdf/plans/far-west-village/farwestvillage.pdf> (accessed May 30 2016)
- ³⁷ http://www1.nyc.gov/assets/planning/download/pdf/plans/washington-greenwich-streets/wa_gw.pdf (accessed May 30 2016)
- ³⁸ Elizabeth McKellar, *The Birth of Modern London: The Development and Design of the City, 1660-1720* (Manchester: Manchester University Press, 1999).
- ³⁹ c.f. T. F. T. Baker and C. R. Elrington, *A History of the County of Middlesex: Volume 8: Islington and Stoke Newington parishes* (London Victoria: County History, 1985); Stephen Inwood, *A History of London* (London: Macmillan, 1998).
- ⁴⁰ The seventeenth century London was regulated by a system that classified streets determining their width and the building heights (Baer, 2007) and this classification is obvious in the Rebuilding Act of 1667 after the Great Fire (Davis, 2006). The Rebuilding Act of 1667, the Metropolitan Building Act of 1844 and the London Building Act of 1894 were fundamental regulation schemes that shaped the two and three-dimensional city form.
- ⁴¹ See Stephan Muthesius *The English Terraced House* (New Haven and London: Yale University Press, 1982), 49-62.
- ⁴² On the morphology of the London terrace see Garyfalia Palaiologou and Laura Vaughan, "Setting up the metropolis: Unpacking the historical spatial cultures of London and Manhattan," *Proceedings of the 10th International Space Syntax Symposium* (London: Space Syntax Laboratory, The Bartlett School of Architecture, University College London, 2015): 55:1-55:18.
- ⁴³ For an analysis of Islington's street network see Garyfalia Palaiologou "High street transactions and interactions," in Vaughan (Ed.), *Suburban urbanities: suburbs and the life of the high street* (London, UK: UCL Press, 2015), 175-203. doi:10.14324/111.9781910634134.
- ⁴⁴ i.e. the architectural treatment of the pavement at the level of individual plots; See Jeremy W. R. Whitehand, "British urban morphology: The Conzenian tradition", *Urban Morphology* 5(2) (2001):103-109.
- ⁴⁵ Back-to-back and terraced typologies were inspired by the British counter models of the time.

⁴⁶ A 'company town' is a massive production of industrial or working class housing provided top-down by a private developer. Porteous (1970) writes that the word 'company' refers to the organisations –individuals or corporations– responsible for their funding, construction and organisation. These residential schemes tended to formulate whole settlements or even towns, a "sea of housing in a uniform style" (*ibid.*, p. 133) and had certain characteristics in common: large scale, remote location, architectural homogeneity, specific target group to accommodate, unity under one command, dependence upon communal services, production at once, hierarchy and strong social control. They represented a specific category of social housing, built by the avant-garde capitalists in order to be rented and used exclusively by their employees; See J. Douglas Porteous, "The Nature of the Company Town," *Transactions of the Institute of British Geographers* (51) (1970): 127-142.

⁴⁷ Joseph J. Ermenc, *Avant-Garde Capitalism in France*. *The French Review*, 31(2) (1957): 129-135.

⁴⁸ c.f. Michael Honhart, "Company housing as urban planning in Germany, 1870–1940", *Central European History* 23(01) (1990): 3-21; Franzika Bollery and Kristina Hartmann, "A patriarchal Utopia: The garden city and housing reform in Germany at the turn of the century," in Anthony Sutcliffe (Ed.), *The rise of modern urban planning* (New York, 1980), 135-164.

⁴⁹ Laws of 1882 and 1910 found in documents of *Permis de Construire* in the Service des Archives of Mulhouse.

⁵⁰ See Loïc Chambaud, Pierre Vidal & François Berger, *Le Projet Urbain Mulhousien*, *Bulletin de la Société Industrielle de Mulhouse* (Mulhouse: Société Industrielle de Mulhouse 2003).

⁵¹ See Service d' Urbanisme, *Plan Local d'Urbanisme* (2008), <http://www.mulhouse.fr/fr/contenu-du-plu/> (accessed June 3 2016). First Plan d'Occupation des Sols approved in 1977 followed by a number of revisions.

⁵² See example *Permis de Construire 1967*, Service des Archives of Mulhouse.

⁵³ Fani Kostourou, "Configurational and morphological sustainability in social housing: The case of Cité Ouvrière in Mulhouse", *Proceedings of the 10th International Space Syntax Symposium* (London: Space Syntax Laboratory, The Bartlett School of Architecture, University College London, 2015): 7:1-7:20.

⁵⁴ See Service d' Urbanisme, *Plan Local d'Urbanisme* (Mulhouse: Ville de Mulhouse, 2008).

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⁵⁵ Fani Kostourou, "Configurational and morphological sustainability in social housing: The case of Cité Ouvrière in Mulhouse", *Proceedings of the 10th International Space Syntax Symposium* (London: Space Syntax Laboratory, The Bartlett School of Architecture, University College London, 2015): 7:1-7:20.

⁵⁶ Garyfalia Palaiologou and Laura Vaughan, "Urban rhythms: Historic housing evolution and socio-spatial boundaries", in Margarita Greene, José Reyes, Andrea Castro (Eds.), *Proceedings of the Eighth International Space Syntax Symposium* (Santiago de Chile: PUC, 2012): 8161.1-8161.21.

⁵⁷ James J. Gibson was the first to introduce the term 'affordance' in his 1979 book *The Ecological Approach to Visual Perception*. He defined affordances as all "action possibilities" latent in the environment, objectively measurable and independent of the individual's ability to recognize them, but on its capabilities. In 1988, Norman's definition of 'perceived affordance' in his book *The Design of Everyday Things* made the whole concept relational by referring only to those possibilities that are readily perceivable by an actor.

⁵⁸ Howard Davis, *The Culture of Building* (New York: Oxford University Press, 2006).

⁵⁹ Jane Jacobs, *The Death and Life of Great American Cities* (Harmondsworth, Middlesex: Penguin, 1961), 198.

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