

all the way up to districts); and, on the other, a complementary sequence of forms related to civil organization (from families to urban communities). These are sequences that find in the concept of *social-building neighbourhood* the lowest common denominator of sustainability: that 'sustainable unit', on which urban strategies of environmental control on a larger scale can be based.

Morphology thus becomes the necessary 'plug-in' for registering the different 'networks' that characterize the contemporary city – from IT and 'smart' devices to energy and environmental systems. The aim is to translate these networks into building practices for the physical city – to translate them into 'fabrics' on which the planning of sustainable cities will be based. The city is not

a 'zero emission settlement machine'. On the contrary, it is the expression of complex and stratified social, economic and cultural fabrics. The constant interaction of these – their innovation and transformation over time – is what determines, to a large extent, the success or failure of an 'authentically' sustainable urban experience.

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## Open space and urban morphology

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Open space performs important functions in the human environment (Lynch, 1995). Examination of this type of space can provide valuable insights into urban form, as pioneering urban morphologists have indicated.

M. R. G. Conzen traced in detail and mapped precisely the changing ground plan of Alnwick. Open spaces were an integral part of this work, forming important components of his fringe-belt maps for six dates from 1774 to 1956 (Conzen, 1960, pp. 57-93). Open spaces in Alnwick increased to a major extent following the expansion of institutional land use in the late-nineteenth century.

Caniggia and Maffei (2001) reveal open spaces arising in both basic and specialized urban tissues. Aggregations of basic tissues along 'matrix routes' constitute one type of open space – an organic or incidental type (pp. 128, 136, 151). Specialized tissues, for example at convergences of break-through routes, tend to be associated with spaces conceived specifically for particular purposes (pp. 120, 122, 137, 149).

The methodology and comprehension of open space can be developed by building on these two classic studies. Besides meticulous mapping, Conzen's townscape hierarchical analysis based on

plot investigation provides an integrated framework to decode open space changes in an urban context. Caniggia and Maffei's concept of basic and specialized tissues suggests the need for typological thinking on planned and incidental open spaces, which would also be pertinent to the contextualization of open space changes in the typological process of urban tissues.

More perspectives on, and knowledge of, open space can be found in other urban morphological research, especially that adopting a Conzenian approach. Fringe belts are a key to understanding successions of open spaces and other spacious land uses in the rhythm of urban development (Whitehand, 1988; Whitehand and Morton, 2003). The identification of fringe belts provides cultural and ecological bases for urban landscape management (Conzen, 2009; Whitehand *et al.*, 2011). Other concepts, such as townscape and development cycles, also relate to the contextualizing of open space evolutions in urban settings at various scales (Whitehand, 1994, 2005). Open space and related topics have been selected as specific themes at several ISUF conferences.

However, urban morphological approaches to open space are still under-represented and, more particularly, quite rarely referred to in studies of

open spaces in other fields. In *Urban Morphology* and the JSTOR digital library, there are only a few articles in which ‘open space’ (or green space, park, square, plaza, piazza) occurs as a keyword in the abstract. Similar results arise when searching in the full text for ‘open space’ (or similar keywords) in combination with the names of urban morphological pioneers. Open space research with urban morphological approaches is rare too. According to the Web of Science and JSTOR, neither ‘Alnwick, Northumberland’ nor ‘architectural composition’ have much direct resonance for open space researchers and planners. What accounts for these weak interrelationships in the literature?

First, urban open spaces differ greatly in their ecological, social, and symbolic roles, and in their shaping mechanisms (Maruani and Amit-Cohen, 2007; Stanley *et al.*, 2012). As the word ‘open’ suggests, open spaces are vague, loose and diversified. They can be incidental spaces containing mundane objects, but they may be constructed symbolizations for political purposes. Soft and hard, private and public, spontaneous and planned are just a few of the juxtapositions associated with open spaces. The complexity presents difficulties for categorization and delineation, which are important for urban morphological research.

Secondly, open spaces tend not to be highly ‘manicured’ or invested in socio-economically (Lynch, 1995), and therefore associated with less archaeological and physical evidence than many other types of urban site. A number of open spaces are ‘left-over’ spaces. Spontaneous open spaces, which were the most important types before industrialization, have decreased gradually and often silently (Jackson, 1984, pp. 127-30).

Thirdly, the processes of change are variable. In the early decades of the industrial era many types of open space were widely regarded as triumphs of urban planning, shaped by city fathers, philanthropists, planners and designers. They were produced and reproduced, to some extent for their symbolic significance, as part and parcel of political and economic activities (Stanley *et al.*, 2012). However, even some open spaces maintained by the government for the public welfare are vulnerable owing to their lack of revenue generation (Tang and Wang, 2008).

Problems of categorization and, sometimes, of delineation, variable amounts of morphological evidence, and uncertain developmental processes pose challenges for analysis in traditional urban morphology. However, regularities have been

demonstrated and there is considerable scope for future research.

First, open space changes coincide with urban transformations. An example is the squares of London, England which were changed from open plazas in the seventeenth century to enclosed private parks at the end of the eighteenth century. The process of ‘greening’ eventually took three forms that inspired widespread emulation: the residential square, the large city park and the house-and-garden of suburbia (Lawrence, 1993). Many cases, including those in London, show that morphological complexity is especially evident where open spaces interface with heterogeneous surroundings.

Secondly, open space is a good starting point for cross-cultural comparisons. There are interesting similarities and differences of open spaces between the Western and Eastern worlds. Western planning proposals and models have been adopted selectively in China and Japan (Lu, 2006; Sakai, 2011).

For a long time, open space has been somewhat marginalized in urban planning, and more research is needed both for its intrinsic academic significance and as a basis for planning. Some recent researches have shown the potential of urban morphological approaches (Foltête and Piombini, 2007; Hopkins, 2011).

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## The morphological basis of practice: learning from doing

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Reconciling change with the maintenance of historical character is a major challenge for urban planners. The *Plano Director Municipal* for Porto offers valuable lessons, not least for urban morphologists designing a house for their own occupation within the area covered by the plan.

The Porto Plan was ratified in January 2006. Its preparation involved a comprehensive typomorphological analysis to identify the tissues constituting the city of Porto. The main characteristics of these tissues formed the basis for the regulations supporting the process of development control. Control of design detail generally decreases from the historical areas to the areas of isolated buildings.

A previous contribution to this journal focused on plan implementation and planning practice (Oliveira *et al.*, 2014). In relation to conservation in historical areas, where design control is at its greatest, the main strengths and weaknesses of development control were identified. Here we offer

a different perspective, focusing on a specific building we have designed ourselves in an urban tissue in which design control is at an intermediate level. Since we are both the owners and the architects of the building, options were either those provided by the Plan or those determined by us.

The house was built on a rectangular plot, 5 m wide and 40 m long (Figure 1). It is within the Plan's 'Tissue III: Areas of Continuous Building Frontages and Plots in the Process of Repletion' (see Oliveira, 2006, for a detailed description of this tissue). The street, Rua do Lindo Vale, is 2 km from the historical centre of Porto. It is 10 m wide and 500 m long, and dates from the nineteenth century. Over recent decades, the street went through major transformations, with numerous demolitions and the construction of many new buildings. The building that previously stood on the plot had already been demolished when the plot was acquired. Only a part of the building's main façade remained intact, and reconstruction was not a feasible option.