The funnel, the sieve and the template: towards an operational urban morphology

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Abstract. *In response to massive housing demand in south-east England and concern for the retention of local character in new development, this paper describes an attempt to introduce the concepts of urban morphology to the design managers of a large house builder. They, like the planners controlling them, tend to focus exclusively on building detail to the neglect of streets and plots. The concepts are introduced in a simplified way in order to make them applicable with limited resources. They are used to produce a template of a local area which is modified according to local regulatory and market conditions. The results demonstrate the influence of highway standards in determining urban form and raise doubts about the utility of the street block in design procedures.*

Key Words: housing design, housebuilders, urban morphology, local character, highway standards

Recent debate in *Urban Morphology* (Whitehand, 2000) suggests that it is timely to remind ourselves that 40 years ago the title of Muratori's seminal work was 'An operational history of Venice' (1959). While we recognize the importance that the concern with history in urban morphology has had for the development of the field, we do believe that ISUF has to make a greater effort to engage with the operational problems that are posed by the production of urban form today. There is a danger that urban morphology is too closely involved in a search for a more refined theory and an apparent obsession, at least when seen by outsiders, with issues such as the burgage plots of medieval Thuringian towns to the exclusion of current problems of urban expansion. Urban morphology has many useful insights to offer the various disciplines concerned with the production of the built environment and it should be prepared to do this even at the cost of a little vulgarization of its message.

We do not need any more theory to demonstrate the importance of a number of concepts such as cycles of change and the importance of property boundaries, which have for some time been the stock in trade of urban morphology, but we do need to get them into the everyday vocabulary of those who produce and control the form of our settlements. One way to do this is through the controllers who operate the planning system via the local plans and the instruments which are known in the United Kingdom as supplementary planning guidance. The most common of these is the guidance produced by local authority

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planning departments. Another way is through the producers, especially the house builders. This article describes an invitation to introduce procedures based on a typomorphological approach to the design managers of a large United Kingdom house builder, Wilcon Homes.

The professional and market contexts

The starting point for our engagement in this project was the requirement for 43,000 houses to be built every year until 2016 in South-East England outside London to meet migratory and demographic needs (Dewar, 2000). In spite of efforts to site much of this development on so-called brownfield sites, land that has been previously converted to urban uses, inevitably there will be a considerable amount of new building on the edge of urban settlements and in so-called new communities being proposed for abandoned military bases and former institutional sites detached from existing towns.

To our knowledge, the planning system in the United Kingdom is unique in being based on a relatively 'weak' plan. The plan is not only supplemented by other documents but it can be overturned by a developer if he can marshal enough arguments to make a successful appeal to the appropriate Central Government Ministry, the Department of the Environment, Transport and the Regions (DETR). Hall has described the inadequacy of these local plans for urban design purposes as they are based on a high degree of two-dimensional generalization and are directed at the control of use rather than form (Hall, 1999). However, we know from urban morphology that form has a much greater resistance to change than use and therefore really needs at least as much, if not more, consideration.

Even where design guidance seeks to elaborate these plans the content usually misses the point. Most guidance amounts to little more that a pious hope that local character will be respected. Most important from the point of view of urban morphology is that, when design guides are published, they seem to focus on matters of design detail and materials, and seem unaware of the way that the deeper structuring levels – especially street layout or plot configuration – affect settlement form. For example, the Lincolnshire Design Guide for Residential Areas (Lincolnshire County Council, 1996) advocates the qualities of traditional settlements over those of recent development by juxtaposing illustrations of both. In the following pages it then proceeds to propose a road layout which would clearly make it impossible ever to produce the type of traditional settlement that is considered so admirable. The authors seem incapable of making a connection between the appearance of a settlement and its underlying structure. A notable exception to this state of affairs is the recent Consultation Draft of the Stratford on Avon District Design Guide edited by Karl Kropf (Stratford on Avon District Council, 2000) which, if adopted and enforced, will mark an important step forward in the use of urban morphological concepts in British planning practice.

The problems stemming from the general neglect of the basic structure of towns are the production of neighbourhoods with streets that do not connect, a neglect of the importance of plot patterns in the accommodation of change, the difficulties in connecting future developments to the edge of recently built housing, the illegibility of street patterns and circuitous and often unsafe pedestrian routes.

Given this lack of specificity about formal issues in the planning system, it is left to the producer of the urban form to make three-dimensional proposals. This is a British tradition – the still much-admired eighteenth-century squares of London were laid out by landowners using standardized housing types. In the case of the large-scale housing developments already referred to, the design planning work is undertaken by the large house-building companies through either their in-house design teams or consultant planners and architects. This would be an acceptable state of affairs if these professions were

adequately equipped to deal with the problems of making the privately-financed urban form that will be sold on to consumers.

The planning profession in the public sector generally does not have the skills, and certainly does not have the time, to produce detailed supplementary guidance: it has been reduced by public funding cuts to undertaking the minimum statutory procedures. On the other hand, the architectural profession seems, at least from the content of the professional journals, to be exclusively concerned with special buildings such as galleries and museums. The production of the ordinary buildings, that are much more significant in determining the quality of our towns, seems largely ignored in the press and certainly neglected in the schools of architecture where it is quite possible to spend five years of training without having designed housing, as distinct from the individual house.

The house builder and urban morphology

The opportunity to introduce urban morphology concepts came through an invitation by Wilcon Homes to hold a series of urban design workshops with its seven regional design teams. Wilcon is a house builder responsible for some 4,500 houses a year throughout England and Scotland. The incentive for this initiative came through its Design and Marketing Director, John Weir, who was concerned to improve the design quality of his product and who had been influenced by visits to the United States and exposure to housing built to designs by architects of the so-called New Urbanism movement.

In considering how the concepts of urban morphology could be introduced to the design teams of Wilcon, we were aware that we would not be able to undertake deep morphological investigations of localities, however much this might be desirable in the interests of analysing and establishing the local character. Publications such as *By design* (DETR, 2000, p. 5) now acknowledge that this is an important element in good design which 'always arises from a thorough and caring understanding of place and context'. But there is still little of practical utility for house builders and others to enable them to adjust their layouts and designs to incorporate critical elements of local character. It is not, as Moudon (1994, p. 301) suggests, that we 'lament the ... thoroughness' of the studies our Italian colleagues are able to undertake. It is rather that we do not have the possibility either from a legislative or resource viewpoint to undertake deep morphological investigations. For example, work such as that carried out in France at Asnières and elsewhere (Samuels, 1999) has always produced a financial deficit and could never have been acheived within the normal commercial parameters of private consultancy. The house-builder design teams will certainly not have the capacity to undertake this type of study, and yet they are being increasingly asked by local authority planning departments to demonstrate the local appropriateness of their schemes.

Developing an operational method

The challenge was, therefore, to develop a morphological approach which has both analytical and prescriptive elements but which is much easier to use and less resource-intensive than conventional morphological techniques. In devising this approach for Wilcon Homes, two attributes were important. First, the method should allow users to make a rapid appraisal of the essential components of local character. Secondly, it should retain sufficient rigour in analysis that it can be used to make decisions about design and layout and provide guidance about what needs to be changed in the standard repertoire of house types, building elements, and materials. In summary, we believe that the advantages of our approach for use in design practice lie in the following strengths of the operational method:

- it is simple and quick to use in commercial situations where there is limited time and information;

- it retains sufficient analytical rigour for users to be able to identify rapidly the essential components of local character;
- it offers a comparatively easy way of identifying the most significant relationships between components of local character as well as the things which matter less; and
- it allows the user to make decisions about whether and how to adapt standard layouts and designs to the constraints set by the market, planning policy and design guidance, and highway regulations.

The approach that we devised uses the concepts of the funnel, the sieve and the template as the mechanisms for moving from analytical to prescriptive stages of design. The aim is to construct a local template for a development site based on a series of stages of analysis of, and prescription for, a 'target' area. The target area is selected for its positive qualities of building, street, and open space design which are considered to be the embodiment of the characteristics of the locality of the proposed development and for their appropriateness to the development site in terms of density (urban, suburban or rural), land forms and desired neighbourhood character suggested by market aspirations.

There are two basic stages to the method. The first involves the completion of checklists, provided on *pro formas*, of the intrinsic elements of built and natural form. The second involves 'sieving' for relationships between these intrinsic elements and the extrinsic elements which affect design and development through market preference, planning policy and design guidelines, and highways regulations. This procedure involves the completion of a series of matrices designed to identify the most significant of these relationships to provide a basis for adapting standard solutions to local conditions. In this way, the designer is able to move from a rapid appraisal of the target area to the production of a template for the development site.

The funnel

The concept of the funnel is derived from the idea of levels of resolution as set out in the work of Caniggia and Conzen, and further developed by Kropf (1993), and applications such as the plan for Asnières (Samuels, 1993). The approach to understanding the built form of the target area is structured according to a funnel as shown in Figure 1. A checklist records the characteristics of the target area at each level of resolution.

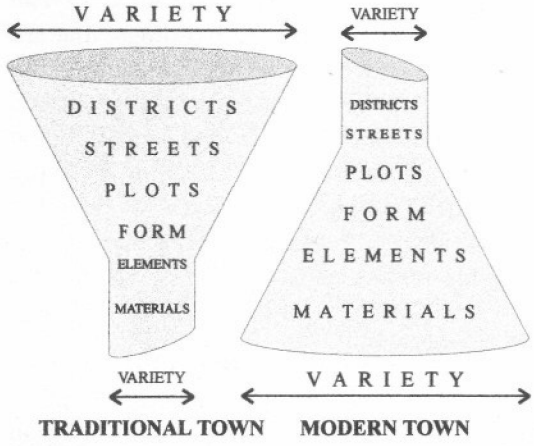

Figure 1. The funnel, showing the variety at different levels of resolution in the traditional town and modern development (drawn by Michelle Le Roux).

At Asnières we noted that traditional settlements are characterized by a wide diversity at the top of the funnel (the range of neighbourhoods, or districts, and street-block and plot sizes), and a progressively reducing diversity towards the bottom of the funnel. Not surprisingly, the vernacular architecture of settlements is distinguished by the limited number of materials available locally (Figure 2). In contrast, in most modern housing developments the funnel is reversed. There is a relatively restricted range of districts, plot sizes and configurations or even buildings. The developers try to overcome this lack of diversity at the higher levels of the funnel by introducing an apparently arbitrary and

Figure 2. A street façade in Bury St Edmunds, England, showing a variety of plot sizes and building types with a limited range of materials.

Figure 3. A modern street façade in Bury St Edmunds, England, where an inappropriate variety of materials has been used in an otherwise sensitive infill development.

excessive amount of diversity at the lowest level – materials (Figure 3). In some developments they pride themselves on making no two adjacent buildings alike in terms of materials and minor building elements, such as porches and dormer windows. The Wilcon designers were very quick to recognize this disparity between the generation of character in traditional settlements and new settlements. However, they found it difficult to move away from a design approach which achieves difference at the level of each house rather than at the street or, even more difficult, at the neighbourhood level of resolution.

Most large house builders are happy to imitate that aspect of local character which expresses different stages of development through building styles: for example, a Georgian building next to a Victorian one in a traditional village or town high street. However, they are reluctant, or perhaps unable because of current highway regulations, to imitate other processes of change higher up the levels of the funnel. The most obvious of these changes is the process by which settlement structure has grown through time from a very dense urban village or town core to various stages of suburban development usually of decreasing density.

The sieve

In terms of taking the operational method to the next stage of development, we do not believe that the concepts of urban morphology are the sole source of design procedures. A proposal cannot be explained exclusively by reference to the elements of the funnel. For example, they do not provide tools to understand land character – the soil conditions, drainage systems, local vegetation. These have to be supplemented by an understanding of the terrain to be built on, the planning context, and the market situation if projects are to be produced that are politically as well as financially feasible. The identification of the essential components of the character of the built form in the target area (analysed according to the elements of the funnel) is supplemented by analysis of the natural characteristics of the development site. This analysis follows a simple framework derived from Beer (1990) which covers slope, aspect, prospect, vegetation (hedges and trees etc.), water systems, ground conditions, and atmospheric, noise and ground pollution.

A series of 'sieves' was devised to test and adapt the target character to create a locally appropriate and commercially realistic template for the new design. We have used the term 'sieve' since it encapsulates the idea of a vigorous sifting of a large amount of information in order to isolate the significant

and useful from the merely interesting in relation to a specific design problem.

By their configuration as matrices the sieves are designed to ensure that, in addition to all issues being considered, any significant relationships between different issues are also noted. For example, in the built-form sieve (Figure 4), notable conjunctions are identified at each level of the funnel – for example, combinations of streets or plots – and also between different levels of the funnel. For instance, there may be a street that consists entirely of three-storey terraced houses in a district which is otherwise of two storeys, or it may be that plots of a given dimension only occur in certain streets of a given width or alignment.

The remaining stage for the intrinsic elements entails sieving for relationships between built form and land character. For example, slopes are analysed according to their orientation, since north-facing slopes will have design implications very different from those of south-facing slopes. This

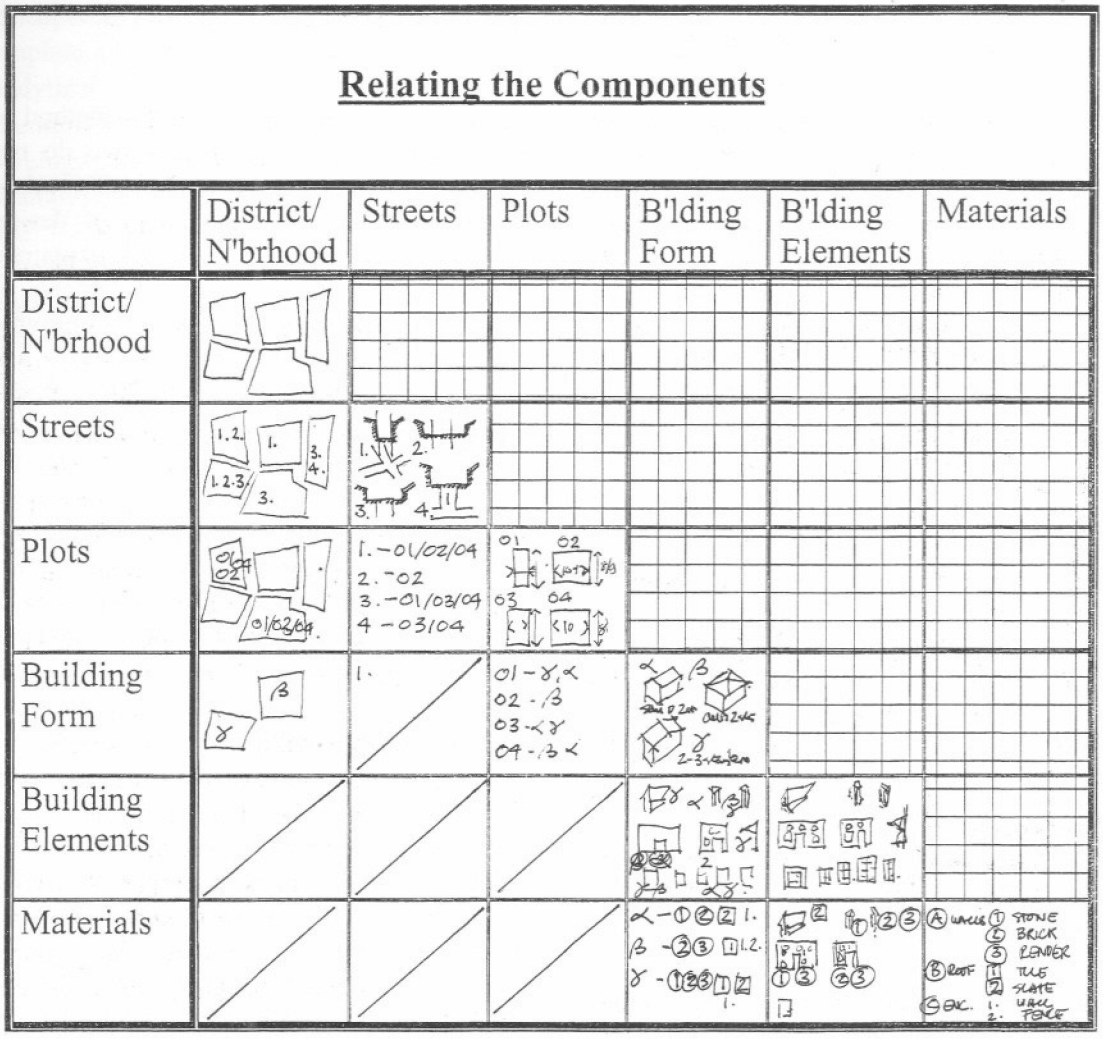

Figure 4. The built-form sieve, compiled by one of the participants in the workshop to show, for example, how plots relate to specific streets and building form relates to districts, streets and plots.

cumulative process of analysis and prescription forms the basis of the template for the development site. In the next stage, the extrinsic elements are sieved for their effects on the template which has so far emerged.

The template

With respect to the local character that is so much sought after by local authorities, we have used the idea of a template that is derived from a 'target area'. By template we mean a pattern which embodies the numerous elements and relationships which together characterize a locality. For example, in an exercise concerned with the layout of an extension of the town of Bury St Edmunds, Suffolk, England, templates were prepared for three target areas that were considered appropriate, one within the town's boundaries and the others consisting of the entire areas of two small villages in the locality. The villages were selected because they contained a mixture of detached and short terraces of houses which were appropriate to the development site both in terms of density and market demand. The selection process of appropriate target areas is thus part of the design procedure. The templates for these areas are formed according to the levels of the funnel. But we cannot simply copy the target area, however appropriate we might consider it as a model.

Target tissues, usually small areas of traditional built form, will have to be modified according to two sets of criteria. The first come from the regulatory context and include road engineering standards, public space adoption criteria and density and parking policies. We have already noted the importance of highway engineering standards with respect to determining the upper levels of the funnel. When it comes to applying the template, this significance is reinforced. In our Suffolk example all the target areas, like traditional settlements everywhere in England, demonstrated frontage development to main roads (Figure 5). Current

Figure 5. A street in Bury St Edmunds, England, showing frontage development on a main street which would be impossible to achieve with modern highway design standards.

engineering practice does not allow frontage development on so-called distributor roads, so that a major concern in adapting the template was to find a solution that retained a street frontage to all streets while satisfying the regulations.

The second set of criteria by which the template needs to be modified derives from the market conditions of the locality. What types of houses can be built to what space standards of house and plot? These, of course, relate to land costs and influence building form, space around buildings and parking arrangements. For example, house values in central Cambridge have allowed Wilcon to provide underground parking which would not be feasible on a lower-value site.

The template resulting from the reading of a locality can be used for two purposes. The first is to prepare a specific design for a given site to be implemented directly by the builder. The second is to prepare a design guide or code for the use of other builders. It is interesting to note that this activity, usually considered the prerogative of the local planning authority, is becoming increasingly common among developers of very large sites that are partially sold on to other builders. They need to protect the value of their own investment against a lowering of quality by other builders who

may be constructing on adjacent sites.

Conclusion

One of the most interesting outcomes of this work is that operationally we have begun to question the relevance of the street block. Towns are not actually built in street blocks – they are a later intellectual rationalization of a process. Street blocks are a secondary element which are formed once streets, street junctions and plot subdivisions have been laid out. Caniggia and Maffei's diagrams of settlement evolution illustrate this point (Caniggia and Maffei, 1981, p. 133).

Certainly it is administratively convenient to think in terms of street blocks, but we have noticed that, when housing districts are designed and allocated to builders in street blocks, the importance of the street as a key character-forming element tends to be neglected. We also found that the term 'block' to house builders means something very different. For them, the block is the three-dimensional terrace or group of buildings rather than the street block of urban design and morphology. This interpretation reflects the ambiguity of the English language use of the word 'block'. In French, for example, the use of *l'îlot* as the street block and *la barre* as the building block in the title of Castex, Depaule and Panerai's seminal work (1977) is quite explicit, while an adequate English translation of this title has to be much longer and certainly less elegant.

It seems to us that it is essential to understand how places grow in order to produce sustainable, resilient new settlements and extensions to existing settlements. The housing developers have made significant advances in adapting their standard layouts and designs at the lower levels of the funnel (Figure 6) but have not yet succeeded in designing the continuities of space that characterized urban growth until the mid-1950s. Nor is there any apparent concern with how these urban areas can change over time as buildings and uses are replaced and altered according to Conzenian cycles of change.

The most likely explanation for this is that there is no pressure being exerted on developers from any direction to achieve joined-up towns with street and block structures capable of future evolution. They certainly do not see it as in their own interests to make provision for connections to existing parts of the town adjacent to their sites. This is always politically sensitive, with existing residents vehemently resisting new development *per se*, and often totally rejecting any proposals to connect with existing street networks for fear of increased through traffic. Neither do developers see it as in their interest to provide for future connections for the next wave of development, as this creates concern that future adjacent developments will be detrimental to their own in terms of land use, quality of design, or social status.

As far as future changes to the fabric are concerned, the large house builders have a relatively short-term interest in the development. Unlike eighteenth-century London landlords, who had a long-term leasehold interest in projects through the leasehold system, present-day developers are, quite justifiably, primarily concerned to sell on the development as quickly as possible in order to recoup their considerable initial investments.

The professional groups who have influence over the built environment – highway engineers, planners and architects – can be seen to exert their control at different and separate levels of the funnel, as illustrated in the 'powergram' (Figure 7), which shows actors in terms of their power or influence over morphological elements (McGlynn, 1993). Engineers are primarily concerned with road layouts, hierarchies and standards; planners primarily with the distribution of land use and regulation of development at the lower levels of the funnel, through the development control process; and architects with the design of individual buildings or small groups of buildings. It is, therefore, the highway engineers who could potentially exert influence over the road

Figure 6. Wilcon house designs, showing how the basic elevation (bottom right-hand corner) of a standard plan can be interpreted in a variety of styles and materials.

layouts and street connections at the upper levels of the funnel. However, in the United Kingdom at least, their rule book is based upon a philosophy of a road system which facilitates the free flow of vehicles organized in a hierarchical arrangement of roads which puts residential areas at the deepest and least-connected ends of the hierarchy (Hillier, 1999, p. 96). This philosophy minimizes through access from one part of a settlement to another on all but the major trunk and distributor roads.

We have already noted the concern of designers for detail, to the exclusion of a concern for higher levels of the funnel. Perhaps they are simply responding to the similar concern of the controllers, to whose demands they are obliged to react. To be fair, this is something about which the more advanced housing developers such as Wilcon

	Suppliers		Producers					Consumers
	Land owner	Funder	Developer	Local authority: Planners	Local authority: Highway engineers	Architects	Urban designers	Everyday users
Street pattern	–	–	○	○	●	–	○	○
Blocks	–	–	–	–	–	–	○	–
Plots - subdivision & amalgamation	●	●	●	○ (in U.K.)	–	–	○	–
Land/building use	●	●	●	●	⊕	○	○	○
Building form - height/mass	–	●	●	●	–	⊕	○	○
- orientation to public space	–	–	○	⊕	–	–	○	○
- elevations	–	○	○	●	–	⊕	○	○
- elements of construction (details/materials)	–	○	●	⊕	–	⊕	○	○

● Power — either to initiate or control
⊕ Responsibility — legislative or contractual
○ Interest/influence — by argument or participation only
– No obvious interest

Figure 7. Power and influence at different levels of the funnel.

are increasingly concerned. They recognize that the product that they are selling is no longer just the house but the locale, the neighbourhood and the community – real or imagined. If politicians and planners shifted their focus to the higher levels of the funnel, then design managers would have to do so too.

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