AN EVIDENCE-BASED APPROACH TO DESIGNING NEW CITIES: THE ENGLISH NEW TOWNS REVISITED

SYNOPSIS

This chapter introduces an analytical study of New Towns in England, aiming to provide a deeper, evidence-based understanding of their planning as well as their social reality. The core methodology of the study is based on 'space syntax', which uses configurational analysis of the spatial network to investigate the performance of urban systems and their socio-economic attributes. The chapter scrutinises the major flaws of the English New Towns and proposes an explanation for why they are not functioning as well as their historic, evolved counterparts. The study provides lessons that could be used for re-designing and re-shaping New Towns in the UK and elsewhere.

BULLET POINTS FOR RESEARCHERS

- Designing New Towns, or any urban development from scratch, is a complex challenge. Try to learn from past errors in order to avoid them in the future.
- Do not rely solely on an intuitive understanding of urban systems. Use 'evidence'.
- Evidence-informed research, integrated with the design and planning process, enhances design outputs and minimises the risk of failure.
- Strong evidence is produced through rigorous methods and analytical processes.
- A good urban methodology needs to be based on a robust urban theory that can deal with space, society and the relationship between the two.

THE CHALLENGES OF BUILDING NEW TOWNS AND THE NECESSITY OF LEARNING FROM THE PAST

Urbanism is confronting remarkable challenges today. Current statistics show that over half of the rapidly growing world population lives in an urban environment. Rapidly-growing cities of the developing world, from China to the Middle-East and South America, are building at incredible rates. In Shanghai alone, several dozen new towns have been planned to accommodate an average of 800,000 by 2020 (Grootens & Hartog, 2010). The most common answer to all these challenges, at least in the fastest-growing part of the world, is building more cities and building them from scratch.

Whilst building cities from scratch has become unprecedented in terms of its speed and magnitude since the middle of the last century, it is not a new phenomenon and has been with us from ancient times. The biggest change has been that rather than evolving relatively slowly, they have developed as a systematic method for coping with the rapid population growth in this period. These resulting settlements are experiencing differing fortunes. A large number of them are struggling to compete with their older, organically grown counterparts. A fundamental understanding of the causes of the failure of previous generations of planned settlements is not only essential for the upgrading and regeneration of existing new towns, but is fundamental for developing the new towns of tomorrow.

This chapter studies a large sample of English New Towns in order to understand why so few of them have succeeded in their aims. A preliminary survey of measurable factors such as property values and commercial activity shows them significantly weaker in comparison to similarly sized towns dating from earlier periods. A review of social conditions and indices of multiple deprivation ranks these towns at the bottom of the leagues of towns and cities in the country (Gardiner, 2004). Whilst they have a common development, socio-economic status and development history, we propose to analyse whether the relative failure of the New Towns experiment is also bound up with their planning and detailed design.

SPACE SYNTAX: THE CORE METHODOLOGY FOR THE STUDY OF NEW TOWNS

In order to have a more objective understanding of the New Towns, and to compare them with other city types, *space syntax*, a set of methods and techniques for the analysis of spatial layouts and linking them with human use, can be used in conjunction with conventional methods.

An understanding of how the public realm, shaped by urban form, can create the potential for encounters and co-presence between different types of social groups, is essential to achieve a more nuanced understanding of cities and settlement patterns,

since only thus is progress made from the common assumption that communities are defined by their spatial boundaries.

Many years of space syntax research have shown that in complex societies containing many and varied communities, public space has a different role to play than a straightforward correspondence with the society that it contains. Rather, the urban environment can be structured so as to enable the encounters between different social groups, both spatial and transpatial (Vaughan & Arbaci, 2011).

The primary *space syntax* technique involves urban grid analysis to reveal patterns of spatial accessibility. In this method all publicly accessible spaces in the urban system are mapped with a network of intersecting 'axes', which represent the major alignments of visibility and movement in the city. The map can be analysed further, using computers and graph algorithms, to establish the relative ease of reaching one point of the system to another. This configurational analysis of the urban system, translated into a diagram (showing the most accessible spaces in red and least accessible spaces in blue; or from dark to light in a greyscale image), creates a clear image of the hierarchy of urban spaces, and the patterns of potential movement and use in any urban system. Underlying the image are numerical values, which are used to make statistical analysis of spatial/social relationships.

The important role of spatial accessibility in urban settlements has been widely documented (Hillier, Penn, Hanson, *et al.*, 1993) (Hillier, Penn, Hanson, *et al.*, 1993)(Hillier, 1996). Previous research has shown that urban areas are largely shaped by patterns of pedestrian, cyclist and vehicular movement. Previous studies using *space syntax* methods also demonstrate that patterns of movement are, in turn, strongly influenced by the layout of the 'movement network' – the way that the system of roads, walkways, squares, and open spaces is joined together. Knowledge of the patterns of spatial accessibility is valuable because these patterns help forecast movement patterns that cannot be observed directly.

Spatial accessibility can be measured in different ways. If the patterns of accessibility are calculated in respect to the whole system, for instance the entire layout of a town, the analysis is called 'global accessibility', and if these patterns are calculated within a defined locality, it is called 'local accessibility'. Further analysis that considers route segments provides a finer detail understanding of the spatial system.

FORMATION AND TRANSITION OF THE ENGLISH NEW TOWNS

The term 'New Town' as it is used today, refers predominantly to the towns which were developed after the Second World War under the New Town Act of 1946. This Act allowed the government to designate areas as New Towns and introduce

development control functions to be handled by Development Corporations. Three generations of the towns were built between 1946 and the late 1970s.

The initial concepts behind modern New Towns emerged in the beginning of the 20th century with urbanists such as Ebenezer Howard and Raymond Unwin, who developed the idea of Garden Cities. The Garden City was to operate as a social experiment in community building that paradoxically was a *rational* plan for a *utopian* form of urbanity, with the best that the country and the city could offer.

Howard's ideas were subsequently taken up in the US and indirectly influenced one of the most influential concepts of the twentieth century – the 'Neighbourhood Unit' (Perry, 1929). In parallel the UK 'homes fit for heroes' programme was focused on creating the first significant phase of municipal housing following the Tudor Walters Report (Swenarton, 1981). The importation of the Garden City via the Neighbourhood Unit back to the UK - realised in the New Towns - can be seen as part of the cultural interplay between US and UK architects throughout the 20th century (Fraser & Kerr, 2007).

Abercrombie's Plan for London (1944) – with its proposal to move about 1.5 million people from London to new and expanded towns - and similar plans for the Clyde Valley in Glasgow and elsewhere, reflected the strong will of the time to confine the uncontrolled sprawl of large cities (Abercrombie, 1943). Indeed, history shows that for the first generation the move was generally a positive one, providing not only better housing, but also education and improvement to working and living conditions too. However, social problems emerged in some of the first New Towns, where construction was often rushed and inhabitants were generally plucked out of their established communities with little ceremony.

The first generation towns reached their initial growth targets in the 1970s. In this period, the development corporations used to set them up were dissolved and their assets disposed. The rented housing was transferred to the local authority, and other assets to the Commission for the New Towns in England, or similar organisations in Wales and Scotland. From 1979 on, politicians saw the New Towns as a socialist experiment to be discontinued, and by 1990 all the development corporations had been dissolved.

By the end of the 20th century it became apparent that the New Town solution was failing almost everywhere. Inhabitants, local authorities and planning organisations, had raised major concerns with their problems of unemployment and social deprivation at the fore. With the exception of a few, New Towns are still not regarded as favourable places in which to live. Evidence of this perception ranges from anecdotal comments to major criticisms based on statistics and observations. The following sections aim to put some numbers against these perceptions.

A visual comparison between many of the New Towns and their more established counterparts reveals some aspects of this negative perception (Figure 1). Underused, poorly integrated public spaces and town centres, together with characterless streets and impoverished residential areas are a common theme. A quote from a charity official based in one of the New Towns says in a BBC report: 'High density large estates with poor amenities, mainly designed for the car not the pedestrian are turning into breeding grounds for petty crime and drug abuse (BBC, 2002).' In a similar article on the relatively successful Milton Keynes, Jonathan Glancey of the Guardian writes: '*For all its greenery, cycle tracks, pedestrian paths, bridleways, ospreys, millions of trees and 800 species of moth, the car here is king, queen and all princes... Just where is that town centre?*' (Glancey, 2006)

Figure 1: The walk from the main train station to the centre of Harlow New Town. No provision for walking has forced people to create their own pathways to the town centre. The character of the streets has been reduced to only vehicular or cycle routes.

A statistical comparison among all local authorities of England, using Indices of Multiple Deprivation (IMD), indicates that almost all of the New Towns are at the bottom of national tables, with the exception of those located in a particularly wealthy region. Even more revealing is the result of comparing the IMD for the New Towns with that of their own counties: in most cases they are significantly more deprived than other settlements in the area (Gardiner, 2004). Despite the statistical limitations of such

comparisons – and the fact that the New Towns were from the start inhabited by a relatively large proportion of socially deprived inhabitants – these facts still help to substantiate the perception that the New Towns have problems in common that distinguish them from other types of settlement, given that a generation or two beyond their initial inhabitation they suffer from disproportionate social problems.

Further UK Government evidence points to a fundamental problem with the design and planning of these towns, specifically, their 'dispersed nature', 'low density', heavy reliance on cars and most specifically the separation of cars and pedestrians as well as the lack of natural surveillance on dwellings (Select Committee on Transport, 2002). The report emphasises that the design of the New Towns is inappropriate for the 21st Century, their infrastructure is deteriorating and all have social and economic problems. The report also refers to the failure of residential areas of the New Town to provide natural surveillance due to their Neighbourhood Unit and Radburn layout concepts: (Select Committee on Transport, 2002).

A subsequent report, 'New Towns: Follow-Up' (Communities and Local Government Committee, 2008) concludes that New Towns have special problems and criticise the UK Government for neglecting 'the particular regeneration requirement of the New Towns (ibid)'. The report recognises that there is an urgent and on-going need for research into new Towns and urges everyone to learn from the past: 'It would be an act of folly not to spend a small sum on trying to learn the lessons of history in order to prevent the past mistakes.' (ibid)

HOW THE NEW TOWNS COMPARE WITH OTHER TOWNS

In order to quantify the apparent distinctiveness of the New Towns, a broad comparison between a set of New Towns and a similar set of older towns can be made. Previous studies have shown that successful, historically evolved towns tend to share a number of common spatial characteristics (Karimi, 1998). These characteristics are important to understand, since the age of some older towns relates to their ability to prevail through times of change and adapt to different circumstances. In this study a sample of New Towns and older settlements were selected for broadly similar characteristics to do with railway and road access to the wider regional centres. Analysis focused on the *urban structure* of old and New Towns: spatial structure, land use distribution, population density, urban block size, centrality, and movement patterns, which collectively define a town's physical, social, economic and environmental characteristics.

In most historic towns the highly accessible spaces (shown in dark red in the spatial accessibility analysis), correspond to the busiest streets in the area (Figures 2 and

3).They are the 'urban streets' that accommodate all varieties of functions and the majority of pedestrian, cyclist and vehicular movement. The global and local accessibility patterns closely correspond, creating an 'intelligible' structure for movement and wayfinding, where visitors and locals are located in the same streets. There is commonly a spatial accessibility core, where smaller urban blocks and mixed land-uses create a suitable environment for people to move around easily on their daily business and interact with each other. This accessibility core is usually well connected to the region and main activity centres. Important functions extend from the town centre to other areas along the main arteries. This type of connected centre supports a mix of transport modes.
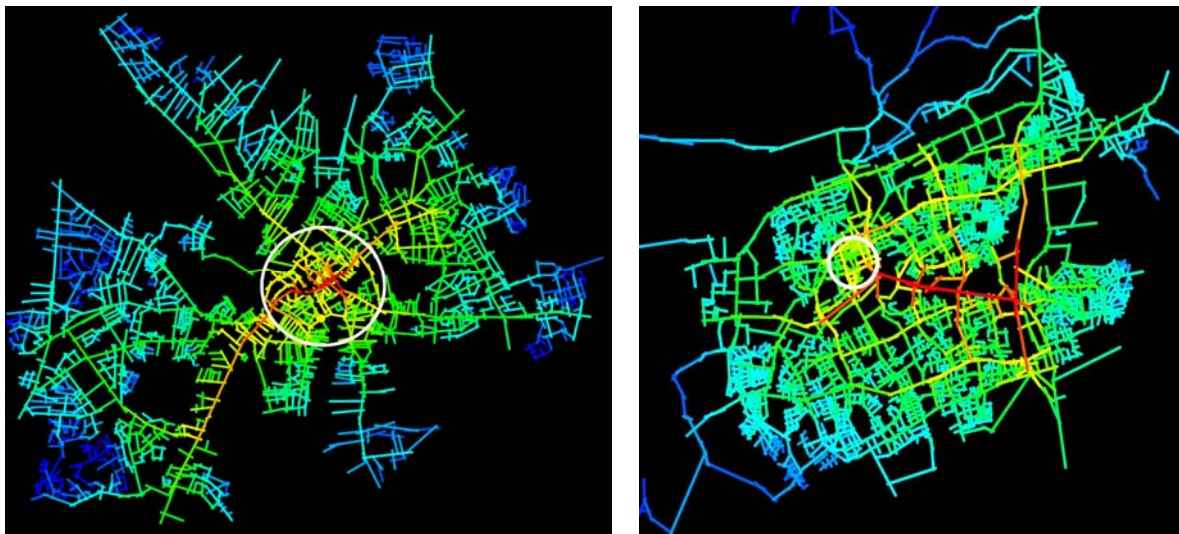

Figure 2: Spatial accessibility analysis of a historically grown town (York on left) compared with a New Town (Harlow on right). Both maps have similar scales.

Figure 3: The central areas of three historically grown towns (top) compared with three New Towns (bottom)

The New Towns present a stark contrast (Figures 2 and 3). The most accessible urban spaces are high-speed vehicular roads without any pedestrian provision. In most cases, there is a distinct mismatch between the location of the most accessible spaces and the location of centres of activity. In cases such as Bracknell, the most accessible streets are on the outskirts of the town centre, where major traffic routes intersect. In some cases, such as Skelmersdale, the planned centre of activity is as spatially segregated as the quiet residential streets.

The New Towns were intended to be 'balanced and self-contained communities for working and living' (Aldridge, 1979, p*48). The outcome has been an extreme version of this aim, with polarised and segmented communities. Typically the town centre does not overlap with the spatial accessibility core, resulting in a mismatch between where the people are and where core activities are located. Streets with high accessibility values are used mostly for private vehicular traffic. As a consequence the urban network creates an environment hostile to pedestrians, in which it is difficult to get around and to interact with others.

Unlike the older residential areas, which usually have a clear pattern or street network related to the bigger structure of the city, the residential areas of the New Towns are fragmented, inward-looking urban 'islands', which relate with the other areas only through a vehicular super-grid. The attempts to create a parallel pedestrian network have failed in many cases, and the separation between the various modes of movement has led to underused and unsafe pedestrian spaces (Figure 4).

Figure 4: A comparison between the streets of historically evolved towns (top) and New Towns (bottom)

The land use patterns in historically evolved towns closely follow the patterns of spatial accessibility. Here, land uses that relate to the most intense human activities, such as retail, catering and commerce are distributed in close correspondence to the spatial structure of the town. In most cases, the most intensively-used shopping streets are also the most spatially accessible. All high streets in the old towns continue their historical role as the commercial heart of the city. Moreover, commercial streets are more extensive and contain a wider mix of activities. In contrast, in the sample of New Towns, zoning has led in some extreme cases - such as Skelmersdale - to the town centre to be reduced to a single, covered shopping centre (Figure 5). Unlike the older towns, with their spectrum of land uses, in New Towns only patches of single land uses can be found.
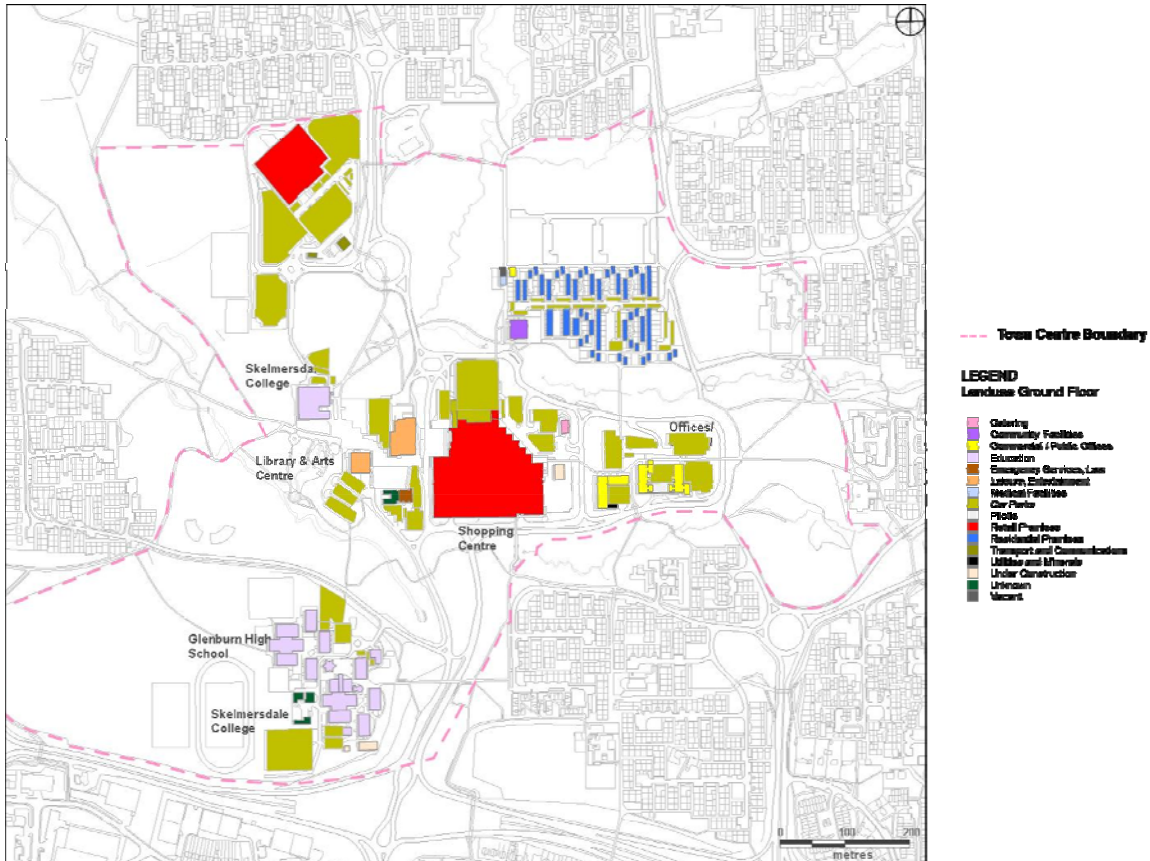
Figure 5: Land use patterns in the centre of Skelmersdale New Town. The large red area is a covered shopping centre. The town centre land uses are limited to this shopping centre, some isolated public buildings and offices (shown in yellow), and a new supermarket (to the north). The most dominant feature of the town centre is the parking areas, shown in green.

Previous research has found that in historically grown towns, the shape of the urban grain optimises itself to increase the proximity between activities and people. Following the distribution of population densities, block sizes become smaller in town centres, where a higher degree of urban activity is required, and become larger in residential areas, where fewer activities take place (Siksna, 1998). In central areas, the higher permeability of the urban blocks facilitates the browsing and navigation needed for a mixed used area, and in residential areas the movement flows are channelled into a small number of streets, which become reasonably well-used and adequately safe. The opposite is the case in most New Towns studied. Whereas urban blocks in the town centres are not small enough to facilitate navigation and browsing, urban blocks in the residential zones are disproportionately large and space is so fragmented that the relatively low movement levels generated by residential uses are distributed across many more streets. This dilution of movement leads to very low levels of co-presence between pedestrians and thus to a perception of a lack of safety in residential areas.

Patterns of observed pedestrian movement flows also demonstrate significant differences between these two urban types. In historic towns, pedestrian movement patterns follow the hierarchy of the spatial network, with a high number of pedestrians using the routes within the core of spatial accessibility. Moving away from the city centre, lower levels of pedestrian movement reduce steadily to the lowest levels within residential areas that are away from main roads and retail locations. The zoning approach used in New Towns typically leads to very high levels of pedestrian movement to be concentrated in a small section of the designated town centres. Movement flows drop sharply from the town centre onwards and are uniformly low in the rest of the town (Figure 6). This movement pattern is the consequence of extreme spatial and functional segregation. In many cases it is also caused by the segregation of modes of transport and the related low availability of pedestrian walkways. This results in a dramatic reduction of pedestrian flows in other parts of the urban realm and the consequential perception of a lack of safety, as mentioned above.
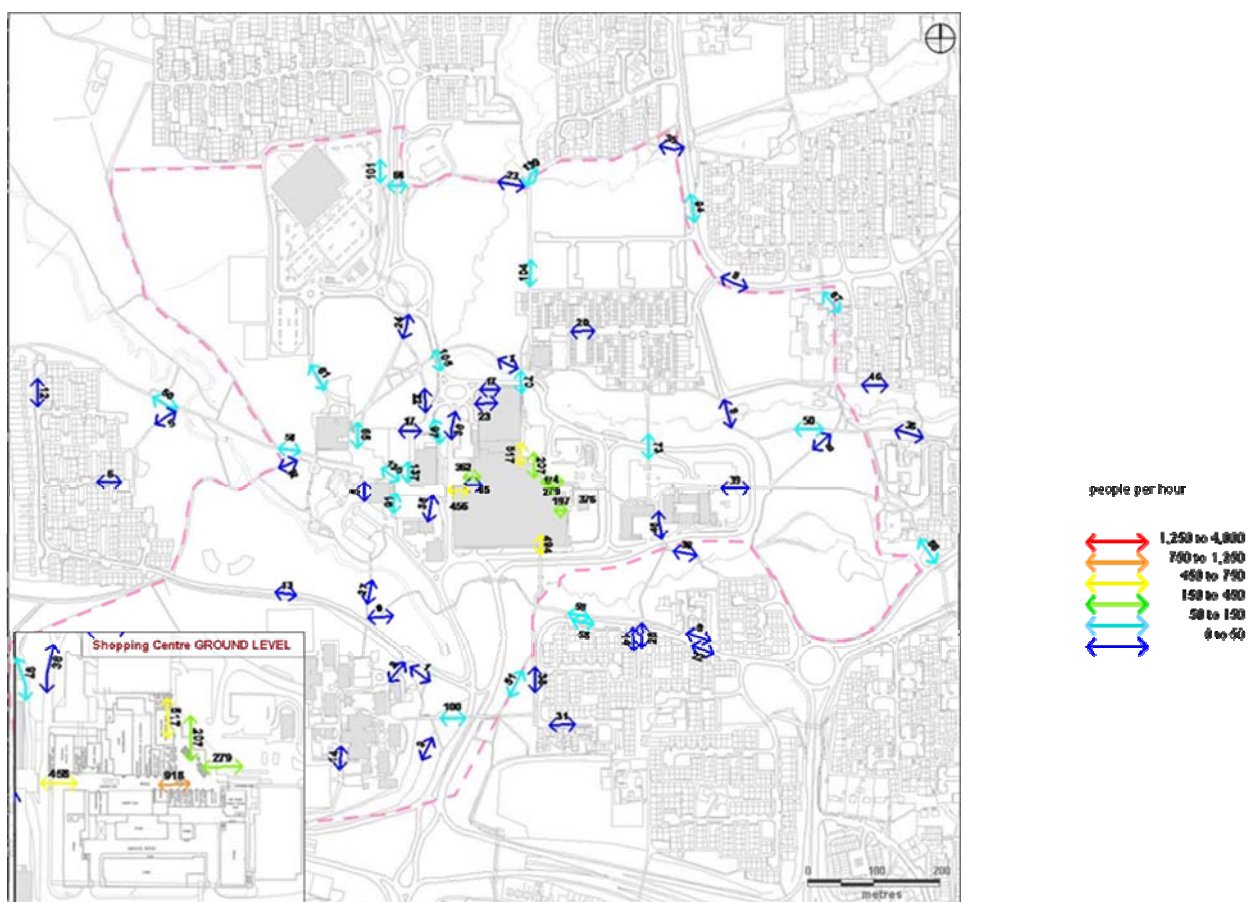

Figure 6: Pedestrian movement flows, observed in the New Town of Skelmersdale. The arrows indicate average hourly flows on a typical weekday. The high pedestrian flows are concentrated only in the shopping centre. The flows drop to lowest levels outside the shopping centre without creating any pattern or hierarchy.

LEARNING FROM THE NEW TOWN EXPERIENCE - AN INTERNATIONAL PERSPECTIVE

Lu has articulated in great detail how the neighbourhood unit became the 'global urban form' of the twentieth century, with variations on a theme as widespread as Canberra, Brasilia and even Le Corbusier's plans for Chandigarh. It is worthwhile considering one of these cases: the Israeli realisation of 34 towns in 20 years (Aravot & Militanu, 2000). Efrat describes how centralised planning was used to resolve the housing needs of the massive number of Jewish refugees who arrived in the new state after WWII (Efrat, 2004). He suggests that Israeli planners 'drew inspiration' (p. 83) from British New Towns to decant overcrowded and war-damaged communities to dispersed new settlements (the latter a particularly Soviet influence, he claims). Efrat also shows direct links to Perry's principles, with the creation of 'ideally' sized self-contained neighbourhoods, with separated pedestrian and vehicular traffic. He describes how the low density of population, coupled with the spatial isolation of the immigrants and the lack of sufficient job opportunities, had a devastating impact on the already disadvantaged residents. Like in the UK, the impact continues to a certain extent to this day (Aharon-Gutman, 2009).

The unintentional influence of the New Town movement on the development of contemporary urbanism can be found almost everywhere in the rapidly-growing cities of the developing world. Many of the concepts that were used in the design of the New Towns in England, such as neighbourhood units, separation of cars and pedestrians, extension of nature into the heart of the towns (with 'green fingers'), confined town centres and land use zoning, are frequently used in the design of new cities and developments, with minimal attempts to analyse the implications of their implementation. More significantly, in some cases, these concepts, which had been originally developed for relatively small settlements, are applied to very large urban systems, which are intended to accommodate millions of people. Lu has shown how in China the influence has been profound – starting with Changchun, set up as the capital by colonial Japan (Lu, 2006, pp*24–25). Indeed, a recently proposed development plan for the city of Changchun in North-East China (with a current population of 7.6 million people, according to the City planning department), shows how the concepts that had been experimented with in the New Towns continue to emerge as solutions for the future plans of a very large city. Massive new extensions, similar to neighbourhood units, but designed for hundreds of thousands of residents appear around the city.' Green fingers', used in New Towns such as Skelmersdale to link the countryside to the heart of the city, cover very large green zones, which break the continuity of the urban form and divide the new urban extensions from each other. There also seems to be a misconception about how the city centre's relationship with the whole system should work. The planning proposals show the existing centre of the city contained within a confined area, and almost acting in competition with a new centre of the same size to the south. This is in contrast with the structural reality of the city, where a very large centre already exists and needs to remain as a dominant element of the city in future.

In other cases where designers consciously attempt to create different design paradigms, untested design decisions and spatial structures have led to a different set of problems. One such example is the city of Masdar in Abu-Dhabi, widely promoted as a sustainable and low-carbon development (Heap, 2010).

Analysis of the initial design proposals showed a poorly structured layout as well as deficiencies such as: lack of a spatially accessible city centre, poor way-finding and pedestrian navigation caused by the lack of a strong correspondence between the global and local accessibility structures, isolation of the residential neighbourhoods from each other and the city centre, and disparity between the spatial structure and distribution of land-uses and densities. Although these deficiencies are not identical to those found in the study of New Towns described here, they are similar enough to suggest that the spatial problems that led to the socio-economic decline of the New Towns would have been repeated here if the initial plans had been implemented. Following an evidence-based review of the scheme in 2009, most of the spatial problems have been remedied in the final scheme for Masdar. However, the point remains that even the most progressive approaches to designing cities in the 21st Century are likely to fall in the traps that the design of New Towns in England experienced in the second half of the 20th Century.
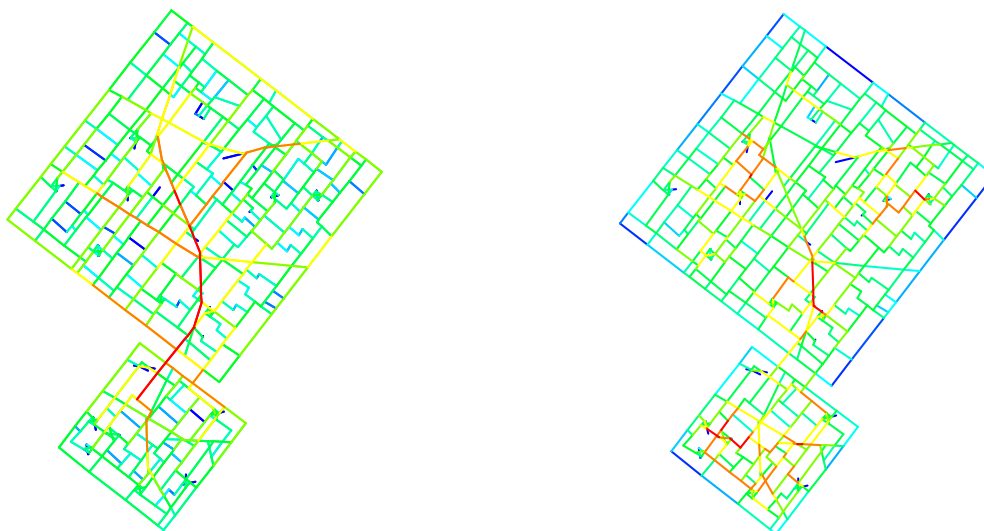

Figure 7: Spatial accessibility analysis of the initial layout for the City of Masdar: global spatial accessibility (left) and local spatial accessibility (right).

THE FUTURE OF THE NEW-NEW TOWN

The 'New – New Towns' conference held in London in 2008 demonstrated that community creation is still top of the policy agenda – both in the UK and elsewhere. Despite this, it is evident that insufficient attention is given towards lessons from past social analysis of new settlements, nor is there sufficient understanding of the impact of urban structure on social and economic performance, as shown here. Whilst society has changed dramatically since the earliest New Towns, it is more urgent than ever to find ways to further the success of some places and remedy the devastating failure of others.

Previous research has suggested that one of the most fundamental problems with the Neighbourhood Unit concept is that it presumes that spatial layout will reflect and reinforce the social relations it contains. As pointed out by Hanson and Hillier (Hanson & Hillier, 1987) whilst this might work in homogenous societies, in modern complex societies, space has a different role to play than a straightforward *correspondence* with the society which it contains. The attempt to design local areas without maintaining their coherence at the wider scale, creates hierarchy without order: local streets are disconnected from the city-wide structure, resulting in a dislocation between locals and visitors; inhabitants and strangers; movement to and through an area.

Despite seminal studies on the subject (Durant, 1939; Jeffreys, 1964), which highlighted the interrelationship between social structure and spatial context, the power of community theories continues to reign. This is particularly the case in the USA, where it is seen as a given that heterogeneous areas are the exception to the norm, and that social groups incline towards exclusive territorial areas defined by colour, ethnicity, social class and economic status. In the UK the desire to plan communities continues to lack a scientific understanding of the complexity of the subject.

This chapter has shown that the failure of the New Towns in the UK is a product of flaws in their design and planning, accompanied by socio-economic consequences to these problems. These flaws are complex by nature, but can be identified through an objective investigation of urban structure and its relationship with the other urban issues. Solutions and mitigation measures for these problems are complex and strongly dependent on how we identify and understand the problems.

Past experience in implementing evidence-based design to New Towns such as Skelmersdale and Harlow shows that the effort to positively transform these towns is not futile, as long as they are based on a thorough understanding of the fundamental problems and the use of specific methods and tools that can help to evaluate and assess the impact of the changes. At its heart the approach requires a detailed analysis of the existing spatial structure and an iterative testing of design propositions

to ensure that any new development relates to the way in which all elements of the town will be regenerated.

In 2004 an Inquiry by Design took place in Harlow. A design think-tank brought together a large number of experts to initiate the visioning for an urban extension to Harlow New Town - Harlow North. Based on the outcome of this workshop, and subsequent team efforts, the development plans for Harlow North have been drawn and debated almost continuously since then. The analysis of the town using space syntax methods showed that Harlow shares the similar design problems that can be found in other new towns (Figure 8a). The residential neighbourhoods are fragmented communities separated by vehicular roads that carry no activity or frontages. There does not seem to be a strong sense of route hierarchy as is usually found in historically-evolved towns. The core of spatial accessibility is found towards the east of the town, rather than the town centre. The town centre, though not as awkward as Skelmersdale's centre, is not the focus of the spatial structure. Quite strangely, the centre has no clear pedestrian link with the main railway station.
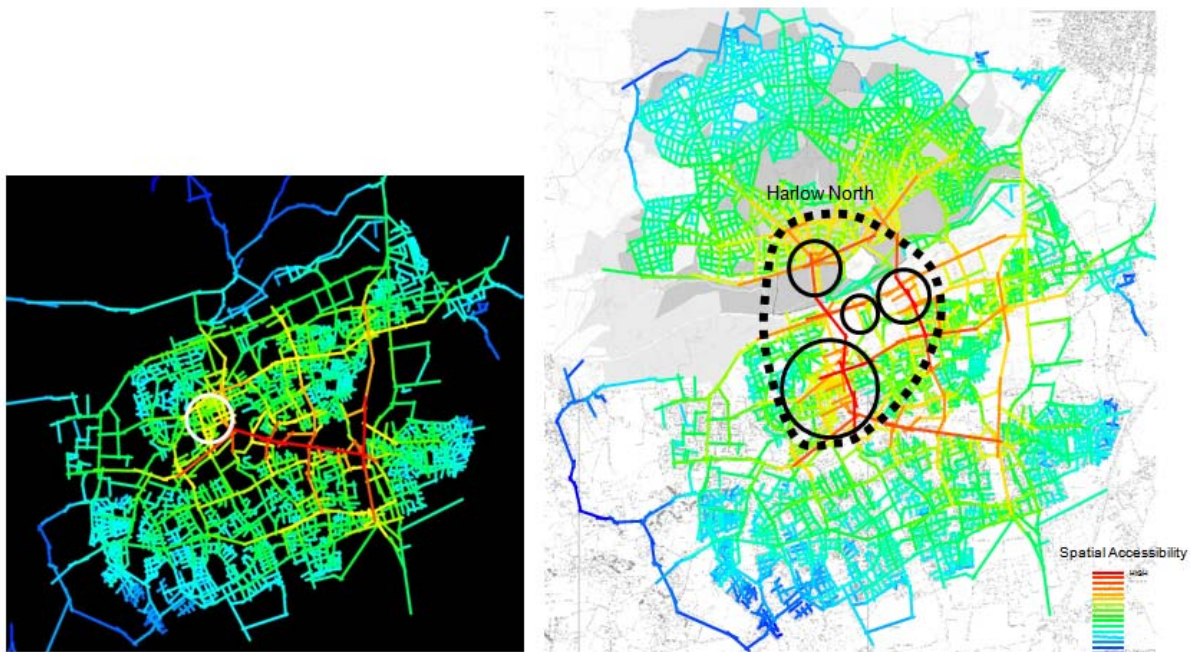

Figure 8: Evidence-based design process applied to the design of an extension to an existing New Town: North Harlow. The methodology, which unravels the fundamental flaws of the original design, becomes an integral part of a design process to create a more enhanced urban extension, and most importantly, help improve the existing town. The result is a unified system that would work as a whole.

In the first phase of the design study the space syntax analysis established that if the development to the north would not create a strong relationship with Harlow as a whole, it might have a negative impact on an already struggling structure and become a competitor, instead of an integrator. From this finding, a major principle of the design was conjectured: North Harlow has to be designed in such a way that can deliver a

successful new urban development and resolve the essential problems of existing Harlow at the same time. A series of preliminary design ideas, tested by space syntax analysis, demonstrated that the link to the town centre across the flood plain was crucial, as long as multiple extra links between the north and south were provided. The analysis was used to optimise the location and alignment of these new links (Figure 8a). Through several reiterations of the design it was established that the centre for Harlow North has to be as close as possible to Harlow town centre in order to create a larger, unified centre for the whole of Harlow. This principle has been achieved by putting the centre at the immediate northern end of the main bridge. The centre was also intensified by creating a network of local routes that radiated from this location. The design was further fine-tuned, until a balanced shape for the whole of the town was achieved (Figure 8b).

The evidence-based design proposition stated that new spatial structure of Harlow has to be accompanied by an increase in the density of the built form within the centre, further investment on improving the character and design of the streets and public realm, more work on reshaping the isolated neighbourhoods, and a whole package of socio-economic remedies that the town desperately needs. The success of these solutions, however, remains dependent on how the fundamental issues of city building are understood and addressed.

The lessons learnt from the study of New Towns in England such as Harlow can provide a powerful way of re-thinking the entire approach to New Towns in the UK, whether we design them from scratch, or try to reshape them to resolve their multiple flaws and inherent problems. This approach can also be transferred to other parts of the world, where building new settlements is an important means of urban development. These lessons are particularly useful in these parts of the world, since the huge rush for building cities, and the sheer magnitude of the development, leave no room for contemplation; otherwise they are condemned to repeat the failures of the past.

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