

suburban solutions – the other side of the story

It is all too easy for policy-makers to jump to simple conclusions on the degree to which urban form affects levels of active travel and transport carbon emissions, but the issue is both complex and contested, say **Hugh Barton, Marcus Grant and Michael Horswell, who report on recent research which casts new light on the impact of neighbourhood planning**

In the September 2009 edition of *Town & Country Planning* colleagues from Cambridge and Leeds University wrote up the results of a major and very ambitious research project on the future sustainability of suburbs.¹ The project, funded by the EPSRC (Engineering and Physical Sciences Research Council), was called SOLUTIONS – the Sustainability Of Land Use and Transport In Outer Neighbourhoods.² The headline conclusion presented was that spatial strategies by themselves could make little difference to the level of greenhouse gas emissions over the next 20 years. Even when land use and transport measures were combined with road pricing, the impacts were still overwhelmed in scale by long-term social and economic trends. The implication drawn was that planning policies aimed at mitigating climate change – such as the compact city strategy – were misguided and indeed in some ways counterproductive.

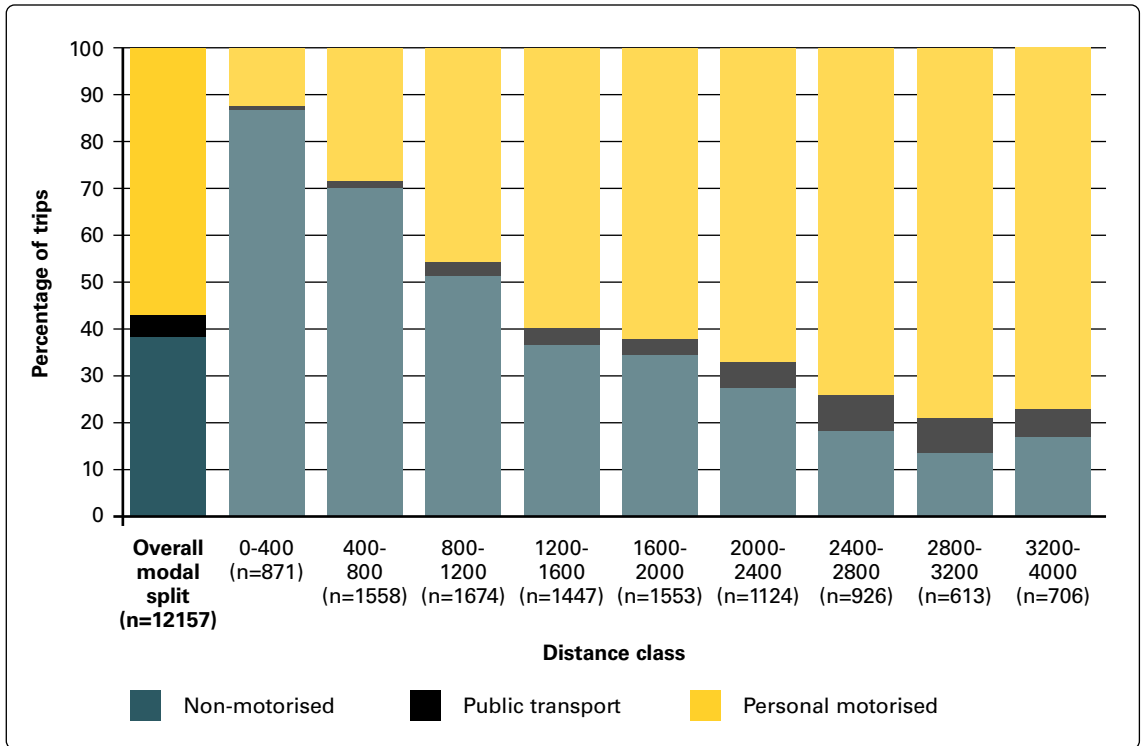
This article challenges the apparent breadth of this conclusion, and, drawing on other facets of the SOLUTIONS work, promotes a radically different view. This is not to deny the value and quality of the research which was reported previously. But there are two key reasons for revisiting the conclusions. First, those conclusions ignored the findings of the parallel research into local, neighbourhood patterns of behaviour (which the authors were involved with

at the University of the West of England – UWE); second, the strategic research which led to the negative conclusions was based on modelling work incorporating assumptions which are, at the least, open to debate.

SOLUTIONS local research

The focus of interest of the local research was health equity: the degree to which local environments are socially inclusive (convenient for less mobile people), and promote active travel (local travel to facilities by foot or pedal). Our conclusion was that while land use and transport strategies at the strategic scale might have only modest impact because of the overall momentum of social and economic change, at the local level they have, and will have, very significant impacts.

The SOLUTIONS local research consisted of two elements: a household survey questionnaire in 12 contrasting localities across four cities, and a design-led exploration of alternative neighbourhood forms in eight of those localities. The locations were suburbs, recent urban extensions and commuter settlements around London, Newcastle upon Tyne, Bristol and Cambridge. The household survey asked people about their use of facilities – food shopping, local retail services, schools, indoor and outdoor



Above

Fig. 1 Modal split by distance bands

leisure – and their usual means of getting to them. The survey achieved 1,600 replies and a 30% response rate. The data was linked to GIS to enable street-based distances to be estimated.

Our expectation – in line with the modelling assumptions and common perceptions of suburban car dependence – was that social variables (age, gender, income, car ownership, etc.), together with distance, would largely determine patterns of behaviour. If we focus on the key issue of modal choice, then the global results do indeed re-affirm the significance of distance (see Fig. 1). One distinctive feature of the results is the flattening out of the rate of decline in active travel in the 1,200-2,000 kilometre range, at around the 40% active travel level. On the basis of other research, this is taken to indicate the contrast between the relatively sedentary population, with a rapid distance decline, and the more active population, willing and able to walk/cycle further.

Socio-economic factors were important in explaining variations in behaviour, but were less dominant than was expected. Still focusing on modal choice:

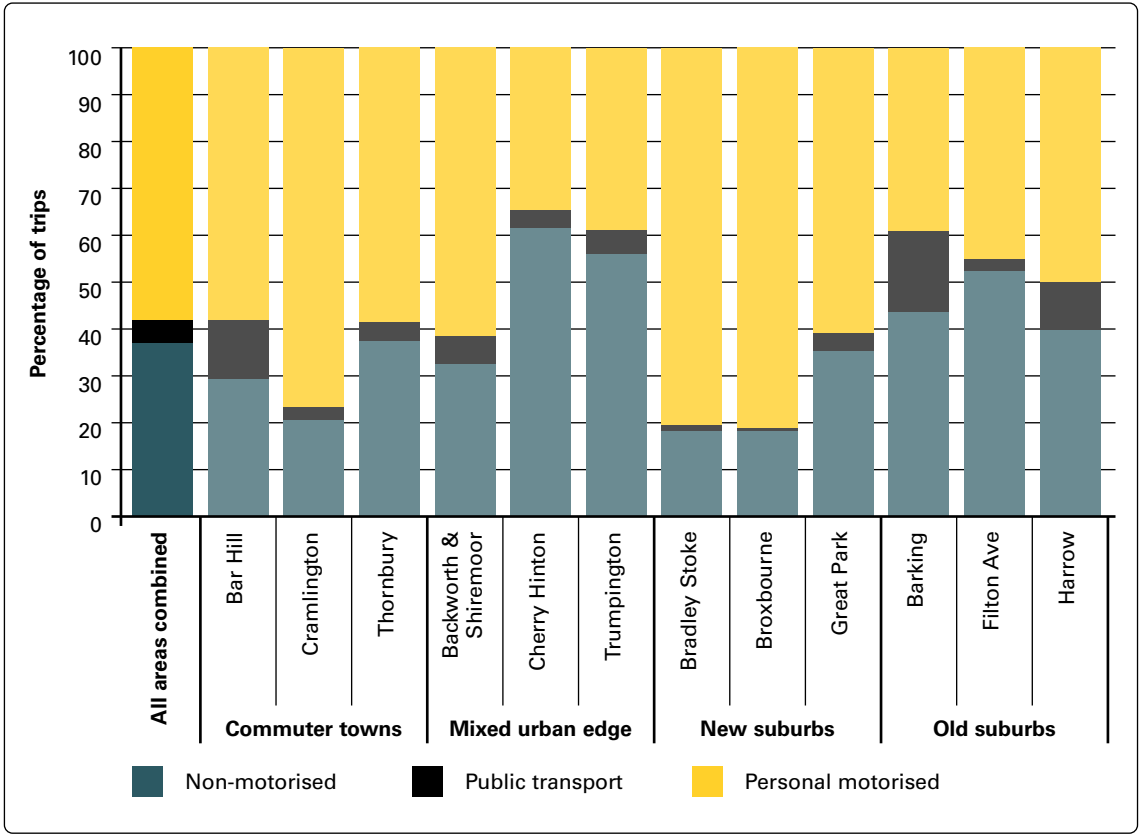
- Different age groups exhibited quite similar behaviour to each other. Car dependence was highest in middle age.
- Gender had no statistical significance.
- Household income was a poor predictor of

behaviour above £20,000, with all £20,000+ income levels exhibiting similar modal choice. Below £20,000, and especially below £15,000, low incomes often coincided with low or no car ownership and resulted in a lower proportion of vehicle trips.

- Car ownership was important, with a steady increase in car reliance from 0 to 1 to 2 to 3+ vehicles. But those without cars still relied on them (for lifts etc.) to a significant degree, perhaps indicating a lack of convenient local facilities and an absence of adequate bus services.

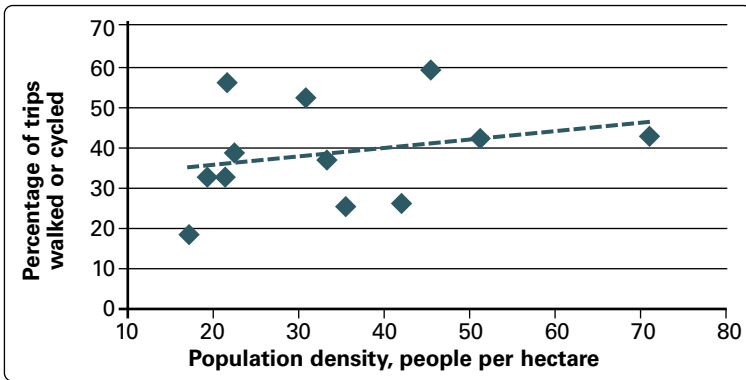
The range of behaviour across different neighbourhoods was, though, surprisingly large. Fig. 2 shows how the level of car dependence varied from a huge majority of trips in Broxbourne (82%) to barely over a third in Cherry Hinton (35%). In parallel, the proportion of walking/cycling trips ranged from 18% to 62%. This behavioural variety, just within suburbs, is not widely recognised, and LUTI (land use/transport interaction) studies do not allow for it.

The explanations for this wide range are far from straightforward. The socio-economic variations between places were not generally critical. The exception was Barking West, in East London. This was the most deprived study area, with the lowest



Above

Fig. 2 Modal split by neighbourhood, arranged by locational type



Left

Fig. 3 Neighbourhood density and levels of active travel

car ownership. A substantial proportion of households had little choice but to walk, or rely on bus services. The lack of local facilities was an important factor. Local shopping arcades had decayed, penalising non-car-owning households and forcing many to walk further than was convenient.

The local availability of superstores, smaller food shops, convenience retail services (pharmacies, post offices, etc.) and schools was very important, because people tend to use the closest facility. Superstores emerged from the survey and focus groups as the

new social centres for casual or planned meetings. People visit them on average twice a week and when they are close will walk to them – in one case 50% of trips were by active travel modes.

In general, a powerful explanatory factor appeared to be the spatial characteristics of the neighbourhood, including the location and viability of available facilities. However, there was no simple spatial variable accounting for differences. The most frequently cited variable – residential density – had, in fact, a very poor correlation with modal choice (see Fig. 3).

The more influential variables were location, neighbourhood coherence, degree of integration with the city, and permeable route networks. In relation to location, for example, the newer peripheral estates were more car dependent than both the older suburbs and the more mixed-age urban fringe areas. This does not bode well for new urban extensions.

An interesting result was that households in places of different social character within the same city would walk (if they did) about the same distance on average to get to facilities – beyond that distance they would leap into the car.

The contrast between Bristol's Bradley Stoke, with low levels of deprivation, and Filton Avenue, with higher levels, was a case in point. The marked variation in the proportion of active travel trips (18% and 53%, respectively) was accounted for by the different distances necessary to reach facilities, *not* by the propensity to walk. Distance in turn was related not to density but to the unit size of provision (in Bradley Stoke generally larger – and newer – units relying on bigger catchments) and the shape of the neighbourhood. Filton Avenue is a largely linear suburb, with a modified grid pattern, well linked into the city; Bradley Stoke is based on a cul-de-sac layout, creating pods of development poorly interlinked, increasing the distance between places.

'Within one city different communities may have similar walking propensities, but contrasting spatial configurations and facility provision lead to very different levels of active travel'

Thus within one city different communities may have similar walking propensities, but contrasting spatial configurations and facility provision lead to very different levels of active travel. *Between* cities the evidence suggests differences of another kind. Cambridge neighbourhoods (Trumpington and Cherry Hinton) have the highest levels of active travel. The residents are prepared to walk much further than those in the Bristol and Newcastle study areas, and many are also cyclists (it should be said that very few of the respondents were students, so that is not the explanation). It is clear that there is a real cultural difference. We may guess that the key reasons are concerned with history, policy and terrain.

In the light of the findings of the SOLUTIONS empirical study, Fig. 4 sets out a conceptual model to help understand the factors determining access to facilities and the associated household travel choices.

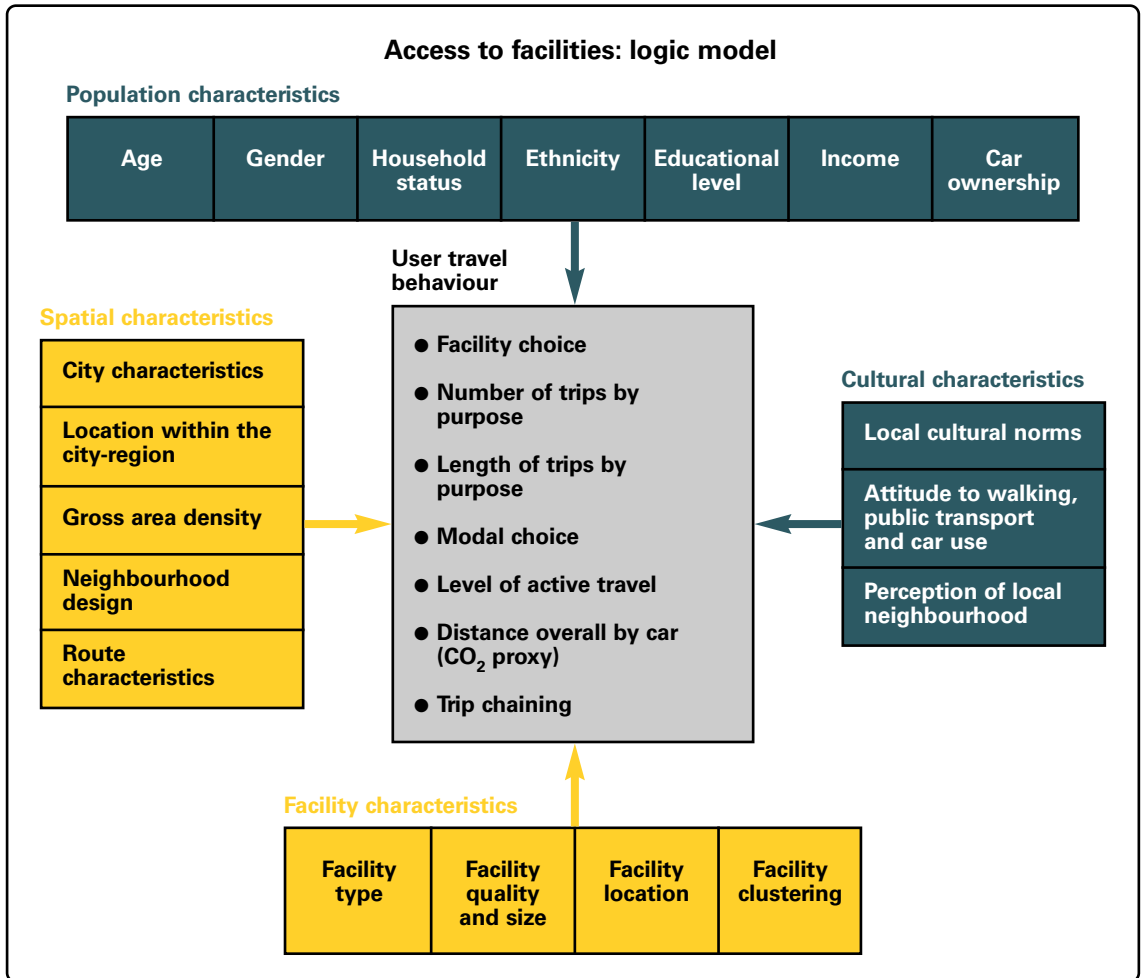
The other part of the SOLUTIONS local research involved testing the efficacy and feasibility of alternative spatial forms at the neighbourhood level. The process involved baseline studies in areas of significant change, design scenarios, evaluation workshops with local stakeholders, and GIS-based accessibility tests. The alternative scenarios were based on four design archetypes, ranging from traditional linear models, through planned neighbourhood designs to late 20th century campus-style development. The question was the degree to which different forms were actually practical in a particular geographical/political context, and the degree to which feasible solutions were likely to result in different levels of accessibility, social inclusion and active travel.

The research assumed that within any particular city culture there is reasonably consistent behaviour in terms of how far people will walk to access local facilities – an assumption largely validated by the household survey. The results demonstrated that the level of active travel varied greatly between design scenarios. This was partly due to issues of geographical feasibility distorting the ideal forms, and partly due to the innate strengths and weaknesses of those forms. Linear solutions were most often 'successful', but in particular contexts traditional neighbourhood units ('cells') or neighbourhood clusters performed best.

The most striking evidence came from the study of Newcastle Great Park. There the emerging planned pattern of development is a series of pods or campuses, hanging off the road system, devoted to different land uses: residential, commercial, retail. We explored and tested the other forms. The most successful was the linear option. On reasonable assumptions about the viability of facilities, the linear scenario provided almost 100% access (within 800 metres) of the residential population to local service centres, and good access to schools, green space and public transport, while the pod scenario achieved good access to green space, but poor access to all other facilities (<20%) – the result of indirect routes, land use segregation, and unhelpful density patterns.

Overall, then, the SOLUTIONS local studies provided a number of insights which challenge the generality of the strategic conclusions:

- Within a given geographical/cultural setting, there is some consistency of behaviour in terms of how far people are prepared to walk, but very considerable variation in actual modal split.
- The behavioural differences between places are strongly related to their spatial characteristics in



Above

Fig. 4 Logic model - the factors determining access to facilities

terms of location within the city-region, facility unit size, and local urban form.

- Alternative neighbourhood designs can profoundly affect the pattern of accessibility and therefore both social inclusion and the likelihood of active travel, with its health benefits.
- While it may be that land use/transport options at the strategic level have modest impact on greenhouse gas emissions, the choices made at a local level can have, for that area, very significant impacts, and thereby modify the overall forecasts in ways which are not accounted for in the LUTI models.

The strategic models

The models of the London, Tyne and Wear and Cambridge regions, on which the main strategic element of SOLUTIONS were based, are complex and multi-dimensional. One of the necessary

simplifying assumptions involves the land use and transport zones which act as units of analysis. It is recognised that the scale and position of zones can affect the reliability and significance of the results.³

In the case of London and the wider South East (LASER) model, the zones are huge, on average about 75,000 people and 40,000 square kilometres in size – geographically smaller in London and bigger in the outer region. The analysis of urban form needs a much finer grain. Even in the case of the Cambridge model, most zones include at least one urban neighbourhood or several rural settlements. From such models it is only possible to draw firm conclusions about broad patterns, such as the degree of concentration or dispersal.

Even in terms of broad patterns the reliability of the SOLUTIONS predictive models is open to debate. First, the timescale for the test of alternative strategies was short: 2016-2031, a mere

15 years, which represents only a small increment by comparison with the inertia of existing urban development. Secondly, and perhaps more fundamentally, the models are dated. They rely on evidence from the 1990s, and have not been fully calibrated (checked against reality) since. The relationships established in the models between economic variables, land uses and movement are historic. They are used, however, to predict the future, thus denying the possibility of values and behaviour changing over a 30-year period.

While of course values *are* often very persistent, there are plenty of examples around Europe where determined policy implementation over a generation has altered the pattern of behaviour, and the implied values. Freiburg is the classic case, but is only one among many.^{4,5} So while the modellers may claim to predict the limited significance of land use/transport planning (for carbon emissions) if nothing changes, over a relatively short timescale and at a strategic scale, they cannot thereby conclude that land use/transport planning has limited significance overall. On the contrary, other

a difficulty in knitting evidence in. This difficulty extended to the neighbourhood-level research undertaken as part of the SOLUTIONS project by UWE. The UWE work pointed to different and more nuanced conclusions, suggesting that local urban form policies, if continued for the long term, could fundamentally alter the decision context of households for good or ill.

Reflections

It is perhaps worth reflecting on the nature of the SOLUTIONS project. Part of the original intent was to build bridges between local spatial frameworks and design on the one hand and strategic land use and transport studies on the other. This was recognised as highly innovative in the context of land use/transport research. But it proved to be a wicked problem.

One reason for the difficulties was purely practical: unexpected delays in model availability, due to external factors, and consequent time pressures. Another reason was philosophical: while the Cambridge researchers believed that predictive models were the most reliable guide to the future, the UWE researchers placed greater faith in new empirical evidence, and extrapolation from that. The team struggled manfully to bridge the gap, and the two arms of study did come together in the context of London, but the tensions in method and approach still inhibited shared conclusions.

There are a few ends to tie up. First, one main focus of the strategic work was greenhouse gas emissions from transport, so what does the local research say about that? It is clear that overall household transport emissions are not captured by the household survey. However, the recorded trips of respondents accounted for 46% of total trips (although less distance) as found by the National Travel Survey, and the car-based travel distances (as a crude proxy for emissions) varied by over 300% between the neighbourhoods studied. So the contribution of trips to local facilities to emissions, positively or negatively, is not negligible. If future development were to be planned in the most effective way, to reduce the need for car travel, promote social inclusion and facilitate healthy physical activity, then urban areas would become more robust in the face of future environmental and economic uncertainty.

Secondly, what are the implications for the broad urban form debate: compact city versus dispersal? The former is, of course, advocated by European and UK policy to promote low-carbon modes, accessibility and urban regeneration. To *some* extent it is being pursued. The evident disadvantage of the compact city strategy, according to the modelling (and logical consideration) is congestion – from two viewpoints. It relies on forcing higher densities in cities by constraining development elsewhere. This

‘The local SOLUTIONS studies back the conclusion that neither free-market dispersal nor excessive compaction are socially and environmentally sustainable. Rather, the evolving structure of human settlement needs to be based on sound logic, informed by good locally specific information, taking active travel, all-mode accessibility and the viability of facilities as key criteria for decisions’

studies show that integrated land use and transport planning is an essential part of a sustainability strategy which also includes fiscal and technological innovation.⁶

One of the weaknesses of the case made in the SOLUTIONS final report⁷ is just this lack of comparator and contextual studies. By way of example, a study of Oxfordshire settlements⁸ demonstrates the significance of decisions about development location for travel generation – but these empirical findings are not encompassed properly in the theoretical models. There was clearly

results in high land and property prices, which impact on housing affordability, and thus social inclusion, and tend to increase labour and commercial costs. It also creates congestion in the road system, exacerbating local pollution.

The paradox of intensification is that if we increase the population of an area in order to support more local services and improve accessibility, this leads to more traffic as well as more pedestrian movement, but the increased traffic reduces the attractiveness of walking/cycling. The only effective escape from the paradox is to invest in public transport and the cycling/pedestrian environment, plan the form of development very carefully to reinforce pedestrian accessibility, and constrain motor traffic. The local design studies, and European cities such as Freiburg, show the spatial principles that could be followed.

The effect of alternative broad strategies on land values and household and business costs (and therefore social welfare and economic growth) is too complex to be properly addressed here. However, the compaction versus dispersal argument as framed by the LUTI models did not provide a level playing field: this concerned the chosen method of traffic constraint. Congestion charging was graded so that city travel was expensive while rural travel was cheap. This means that costs were disproportionately loaded onto compact (urban-based) strategies by comparison with dispersed (rural development) strategies, thus affecting the relative economic and social welfare benefits.

Our contention is that *either* the congestion charge must become a carbon charge (fuel or distance based), so as to make town and country more equal, *or* reliance should be put on workplace and retail etc. parking charges, again universally applied, graded by establishment size so as to deter excessive service centralisation and consequent longer journeys.

The local SOLUTIONS studies, while only providing shafts of light on particular places within the city-regions, back the conclusion that neither free-market dispersal nor excessive compaction are socially and environmentally sustainable. Rather, the evolving structure of human settlement needs to be based on sound logic, informed by good locally specific information, taking active travel, all-mode accessibility and the viability of facilities as key criteria for decisions.

Clear, consistent broad strategies and coherent neighbourhood planning of course rely on effective collaborative processes including policy-makers, investors (public as well as private sector) and the communities involved. The evidence shows it is not generally happening in the UK – we are still pursuing ‘the primrose path to the everlasting bonfire’. But elsewhere in Europe the healthy

strategy is working. A study tour of Freiburg, linked to SOLUTIONS, demonstrated its practicality and self-evident benefits.⁹ As one participant commented: ‘In the UK we know what *needs* to be done, but in Freiburg they have just *done* it.’

● **Hugh Barton** is Professor of Planning, Health and Sustainability and Director for Healthy Urban Environments at the University of the West of England; **Marcus Grant** is Deputy Director of the WHO Collaborating Centre for Healthy Cities at the University of the West of England; and **Michael Horswell** is Senior Lecturer in Applied GIS and Spatial Analysis in the Department of Geography and Environmental Management at the University of the West of England. The views expressed here are personal.

Notes

- 1 M. Echenique, A. Hargreaves and G. Mitchell: ‘Spatial planning, sustainability and long-run trends’. *Town & Country Planning*, 2009, Vol. 78, Sept., 380-5
- 2 The SOLUTIONS project was undertaken by a consortium of universities, led by Cambridge, and including the University of the West of England, Leeds University, University College London, and Newcastle University
- 3 J. Viegas, L. Martinez and E. Silva: ‘Effects of the modifiable areal unit problem on the delineation of traffic analysis zones’. *Environment & Planning B*, 2009, Vol. 36 (4), 625-43 (2008, doi:10. 1068/b34033)
- 4 P. Hall: ‘Catching up with our visions’. *Town & Country Planning*, 2008, Vol. 77, Nov., 444-9
- 5 *Beyond Eco-towns: Applying the Lessons from Europe. Report and Conclusions*. PRP, URBED and Design for Homes. PRP Architects, 2008. www.prparchitects.co.uk/research-development/research-publications/2008/beyond-eco-towns.html
- 6 See D. Blackledge, A. May and M. Wegener: ‘Lessons for policy’. In S. Marshall and D. Banister: *Land Use and Transport Planning: European Perspectives on Integrated Policies*. Elsevier, 2007 – the chapter draws on 11 separate research projects, including Propolis and Scatter, to reach robust conclusions
- 7 See www.suburbansolutions.ac.uk
- 8 P. Headicar: ‘PPG13: evidence of the strategic deficit’. *Town & Country Planning*, 2010, Vol. 79, Feb., 77-84
- 9 K. Pratt: *The Value of Influence: A Case Study of Knowledge Transfer and Interaction from the Sustainable Urban Environment Programme*. ISSUES Project, Jul. 2010. www.urbansustainabilityexchange.org.uk/media/ISSUES%20Outputs/Impact%20Case%20Study%20-%20SOLUTIONS%20%28v4%29.pdf