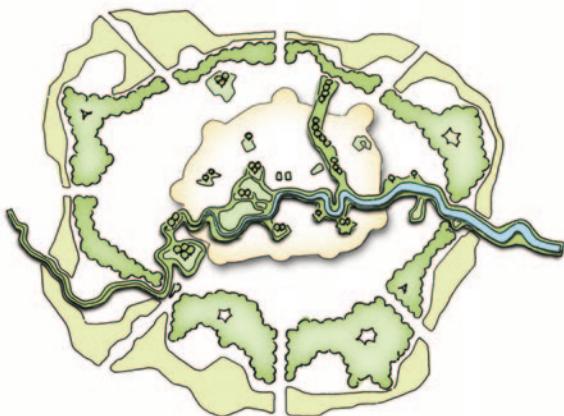


City making: many hands, over time

Terry Farrell calls for a more creative and collaborative endeavour. Key players need to adapt and evolve

In this article I want to examine the extraordinary collective phenomena of human habitat - villages, towns, cities and the metropolis (I would extend this to include the habitat of human-made landscape, as all of the UK, even our national parks, are manifestations of such habitats). In spite of all the complexity, they work because of dynamic interactions that we cannot fully conceptualise or understand. These complexities, the very networks underpinning it all – even the most sophisticated computers we have can't yet grasp the awesome intricacies of the city. They are a wonder of the results of the creativity of our species.

I have no doubt that the city is humankind's greatest creative achievement, far greater than achievements in science or any of the arts including architecture. What we see with the benefit of today's bird's eye views – photographs from the air via planes, drones and satellites on say Google Earth, it reveals a simply spectacular collection of forms. I am awestruck and full of wonder at what is collectively achieved. But, there arises the question: How did we do all this? What processes made these elements, this overall phenomena?



National Park City: we need to improve the accessibility and integration of our green and wild spaces so that they can be used to their full potential for education, recreation, healthy living and food production, as well as to ensure the protection of natural habitats.

Many Hands, Over Time

The most astonishing emerging response is that they are not made by a Mozart or Picasso, or even a grand Churchillian political figure or a despot like Stalin. Far from it, they were made by very many disparate hands and, what's more, they were made and layered by generations, often over centuries or even millennia.

It is significant that this evolutionary, additive nature is so fundamentally a part of England's character, and, in that, the towns and cities here have much to lead the world in. From the law of

the land derived from custom to precedent rather than statutes. To language itself, with its happy air of casualness and lack of rigidity, there is, in the inherent make-up of the English that which relies on informality and "happy" accident. *"One of the fundamental virtues of English is that it is a fluid and democratic language in which meanings shift and change in response to the pressures of common usage.... It is a natural process."* (Bill Bryson, *Mother Tongue*). And so it extends to landscaping and city making.

Being an island, the landscape itself is highly varied with no extremes leading to the design and layout of landscapes and towns, unlike our continental neighbours, the French and Italians, with their severe geometric and formal gardens and their over reliance on order and top down regulations. Instead, our designs are laid out seemingly deliberately without any definite plan. In short, like our laws, like our language and so much else, our cities and landscapes seem to have been much more the result of a reliance on evolution, and reflects how cities are laid out worldwide, growing and changing as the result of many hands layered, over time.

The many hands involve all the people inhabiting our urban areas, not just the designers or the builders like bricklayers and plumbers, but the ordinary people that live there. Their needs and their actions are writ large upon their houses, streets, shops and schools and gardens. It includes the old and young, the clever and the ordinary, the powerful and the disenchanted alike. Architects, planners and "designers" have only done and still do such a small percentage of the physical design of the details and general layout of our buildings. Design does not prevail, except in a subliminal self-ordering way achieved by many hands over time.

"It is scarcely surprising that, since the major preoccupation of urban planners is with the design of cities, they have generally attempted to analyse city forms in terms of the effects of their efforts. That is to say, theories of urban planning have tended to focus on cities in whose form the guiding hand of human design is clearly discernible.

The trouble is, hardly any cities are like this. In spite of the efforts of planners to impose a simplistic order, most large cities present an apparently disordered, irregular scatter of developed space... mixed haphazardly. By focusing on regions where planning has created some regularity... urban theorists have often ignored that fact that overall, a city grows organically, not through the dictates of planners."

So much is driven by an accumulation guided by instinct or habits unknown or hidden that follow patterns of collective behaviour. The DNA of place and habitat of humans is organised, laid-out and improved with neighbourhoods surrounding the civic, the edges growing and emerging over time – layered as it grows and changes and emerges from managed landscape and agricultural land through all stages of villages, towns and cities.



Sir Terry Farrell CBE is chairman of Farrells

The stupendous rate of urban population growth means that the future success of cities is not by any means certain

These habitats were made over time by distant to present generations and made by self-ordering systems, a super organism "collected properties that are more sophisticated in its basic parts, this phenomena known as emergence is what happens when simple units interact in the right ways and something larger arises."

Self-Ordering and Emergence

The notion of emergence – which Michael Weinstock describes in his book *The Architecture of Emergence* as requiring 'the recognition of all the forms of the world not as singular and fixed bodies, but as complex energy and material systems that have a lifespan, exist as part of the environment of other active systems, and as one iteration of an endless series that proceeds by evolutionary development' – has only recently started to become recognised in city making. Weinstock goes on to state that 'causality is dynamic, comprised of multi-scaled patterns of self-organisation ...To study form is to study change.' This is as true of urbanism as it is of any other field.

Self-organisation as a subject for study and written texts has been predictably non-linear. It has roots in many crossover disciplines, including the economics of Adam Smith in the late 18th century, as well as the sociology of Friedrich Engels and the biology of Charles Darwin in the mid-19th century. These began to be unified with the mathematical powers of the computer led by Alan Turing and others in the mid-20th century. A recurring theme is the search for patterns in micro-behaviour that evolves, shifts and emerges as macro-behaviour. Darwin was a typical 'searcher' in this field of complexity, in that he immersed himself in his habitats and spent a lifetime observing like a detective – looking for patterns and orders. It is unsurprising that the new mathematics of Turing's computer age returned to look at biology again, but with new eyes, new tools. Biomathematics emerged and remains at the forefront; but the lessons for all areas, including the city, soon became evident. The field of mycology led to ants, bees and on to human behaviour, our habitats and our interactions with them.

It was only then that the city became a selected subject for the study of emergence. Jane Jacobs is often credited with being the first (in any field) to use the term 'organised complexity' when, in *The Death and Life of Great American Cities* (1961), she began the first rethink in the modern era of city planning. As she argued: '*In parts of cities which are working well in some respects and badly in others ... we cannot even analyse the virtues and faults ... without going at them as problems of organised complexity.*' In his 2001 book *Emergence*, Steven Johnson observed: "*Traditional cities ... are rarely built with any aim at all: they just happen. ... organic cities ... are more an imprint of collective behaviour than the work of master planners. They are the sum of thousands of local interactions: clustering, sharing, crowding, trading – all disparate activities that coalesce into the totality of urban living.*"

Christopher Alexander also took up the idea of emergent forms of life: in his four-volume *The Nature of Order* (2003–4) he produced an overarching theory of a pattern of organisation from nature to city planning and architecture. Like many other books on the subject written in this period, his work is arguably too



deterministic, undermined by a need to find new orthodoxies, new absolutes, a new order rather than the simpler acceptance of finding the order that is already there. Nevertheless, his astute observations of simple urban artefacts are a good way to begin. These already appeared in his earlier article 'A City Is Not A Tree' (1966), in which he describes a scene featuring a newsstand that is dependent on the adjacent set of traffic lights for its supply of customers: 'the newsrack, the newspapers on it, the money going from people's pockets to the dime slot, the people who stop at the light and read the papers, the electric impulses which make the traffic lights change and the sidewalk which the people stand on, form a system – they all work together.' Can the

ABOVE:
Bologna, Italy (top) &
Fulham, London (bottom):
Organic nature of evolutionary growth of European cities. Whilst Bologna's beauty is more self-evident, London's incremental Victorian streets and houses, built over time by developer builders are equally spectacular en masse.

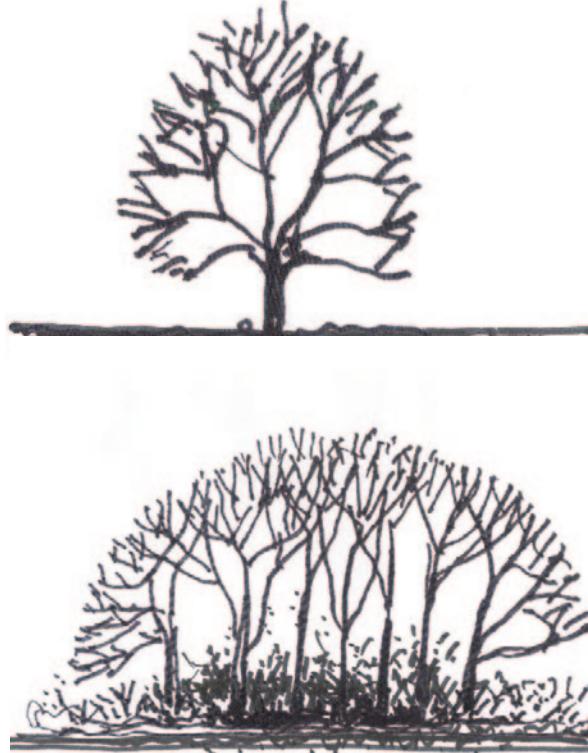
architect/planner rearrange or reinvent these physical things to make a more relevant order? Or does design follow, not lead? Jane Jacobs reserves her most withering observation of architectural vanity for Le Corbusier and his misplaced new ordering: "Le Corbusier's dream city was like a wonderful mechanical toy, but as to how the city works, it tells ... nothing but lies. ... There is a quality even meaner than outright ugliness or disorder and this is the dishonest mask of the pretended order, achieved by ignoring or suppressing the real order that is struggling to exist and to be served."

Evolution and City Making

The overriding conceptual idea for my view of city making is that "*Nothing in science and the humanities makes sense except in the light of evolution.*" The concluding passage of Charles Darwin's *On the Origin of Species* (1859) addresses this point brilliantly, in the power and imagination of his words: "It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. ... THERE IS A GRANDEUR IN THIS VIEW OF LIFE... FROM SO SIMPLE A BEGINNING ENDLESS FORMS MOST BEAUTIFUL AND MOST WONDERFUL HAVE BEEN, AND ARE BEING EVOLVED."

RIGHT:

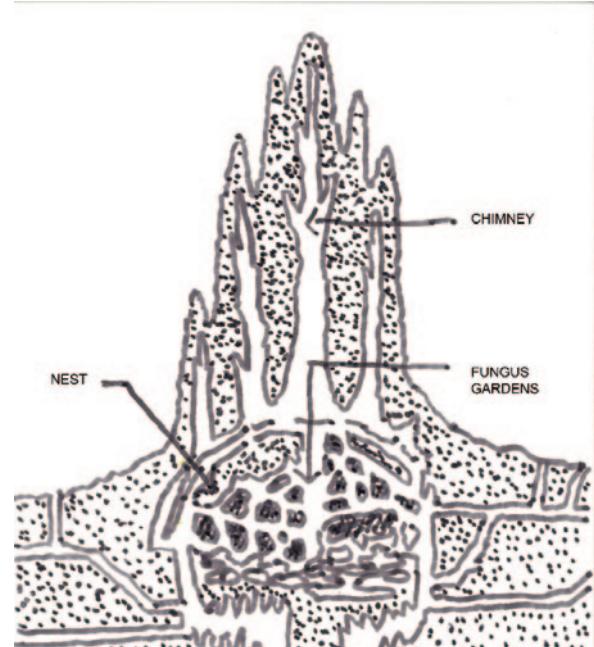
Woodlands (bottom) and Tree (top), Farrell, 2010: The self-ordering collective of a woodland: Edge trees grow lopsidedly, central trees grow tall reaching for the light, but with spindly lower branches. A rich flora exists below which varies according to its position in the woodland. This is horticulture close to urbiculture. Trees in their isolated state on grassland. This is how signature architects and their clients prefer to see their work and the city. Stand alone, but with no connectedness or rich undergrowth.

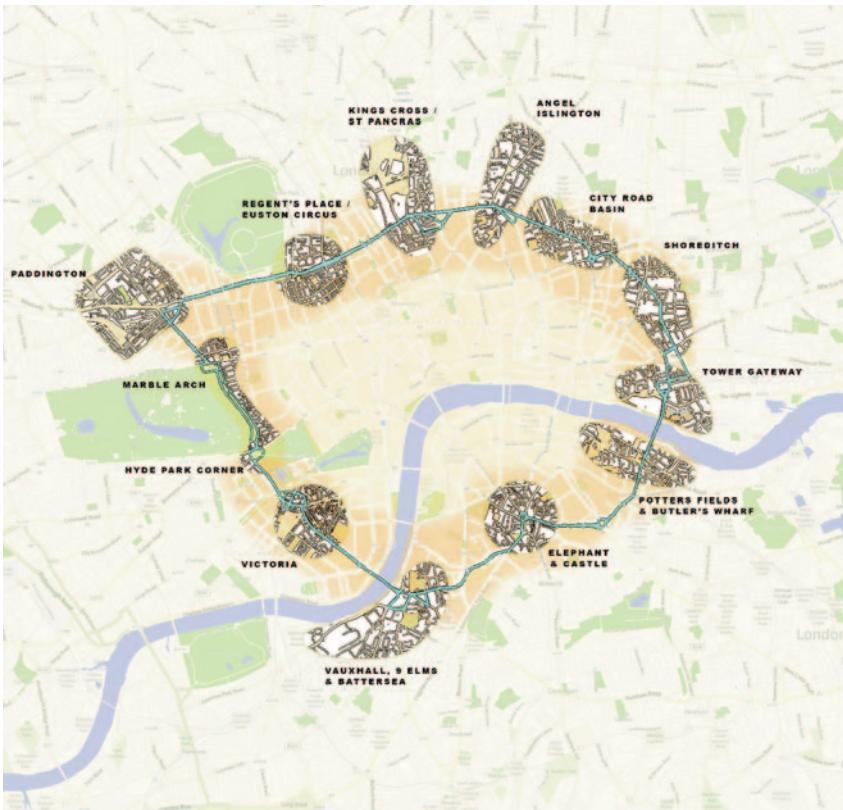


The parallel is in urban culture: separate grand architectural statements alone do not make for rich urbanism. (By the fifth edition, published in 1869, Darwin had truncated 'entangled bank' to the more widely quoted wording 'tangled bank'). Well over a century later, in 1995, Daniel Dennett described Darwin's theory of evolution by natural selection as 'the single best idea anyone has ever had' and Peter Watson commented in 2000 that: "...various fields of inquiry ... are now coming together powerfully, convincingly, to tell one story about the natural world. This story, this one story ... includes the evolution of the universe, of the earth itself, its continents and oceans, the origins of life, the peopling of the globe, and the development of different races, with their differing civilisations. Underlying this story, and giving it a framework, is the process of evolution."

It is befitting then, for the purpose of this article, to highlight that perhaps the most fascinating aspects of Darwin and his successors' work is not relating to 'life' itself, but those regarding 'habitat' and the interactions between the two. The same forces have created habitat for us humans, and it is because of this that our built environment can be seen to display not visual disorder but something of the 'grandeur' and 'forms most beautiful and most wonderful' of Darwin's tangled bank.

It is now some 10,000 years since we evolved from hunter-gatherers to agriculturalists, and we have ever continued to accelerate our development from passive dependency on nature to being its masters and controllers, for good or ill. The profound revelations of the natural sciences over the last 250 years have been played out at the same time as our species completed the latest and most radical stage of evolution: the urban revolution.





No species is guaranteed survival – far from it. With our brains, we clever, adaptable humans may, however, just as readily be building our own demise as our continued success.

The Brain and Towards the Smart City

There is an emerging bridge between our increased understanding of the architecture of the brain and the smart city. The architecture of the world of computing with all its increasing powers can match up to and increasingly deal with the dynamic complexities of the city which itself is directly the result of the community brain power of its human inhabitants.

"In this age of digital hyperlinking, it's more important than ever to understand the links between humans. Human brains are fundamentally wired to interact: we're a splendidly social species. Although our social drives can sometimes be manipulated, they also sit squarely at the centre of the human success story."

You might assume that you end at the border of your skin, but there's a sense in which there's no way to mark the end of you and the beginning of all those around you. Your neurons and those of everyone on the planet interplay in a giant, shifting super-organism. What we demarcate as you is simply a network in a larger network. If we want a bright future for our species, we'll want to continue to research how human brains interact – the dangers as well as the opportunities. Because there's no avoiding the truth etched into the wiring of our brains: we need each other."

This is all paralleled in the splendour of the city, which has matched, step-by-step, in perfect co-evolution with the human brain. "This leads to a fundamental question: can a mind emerge from anything with lots of interacting parts? For example could a city be conscious? After all, a city is built on the interaction between elements. Think of all the signals moving through a city: telephone wires, fibre optic lines, sewers carrying waste, every handshake between humans, every traffic light, and so on. The

LEFT:

Cross section sketch of a termite mound, Farrell, 2013: The natural, self-organised community of the termite – which is thought to have been around, adapting and forming, for some 30 million years. The ingenuity, cleverness and engineering design that contribute to this phenomenon, which is nevertheless created by a collection of brains working by instinct, is extraordinary. The mounds themselves can be viewed as huge stomachs, acting as a sort of compost heap and fungus garden to feed the resident insects.

LEFT:

The Road to Renewal, Farrell, 2013: New places from post-industrial backlands once again provides the neighbourhood high streets.

scale of interaction in a city is on a par with the human brain. Of course, it would be very hard to know if a city were conscious. How could it tell us? How could we ask it?"

And.... "Instead of the brain as a city. If you were to look out over a city and ask "where is the economy located?" you'd see there's no good answer to the question. Instead, the economy emerges from the interaction of all the elements – from the stores and the banks to the merchants and the customers."

Planning a City in the Digital Age

The planning, organisation and governance of our towns and cities are being rapidly transformed by the ever-increasing ability to use big data to capture, analyse and forecast. "The technologies of our modern era allow us to store unimaginable amounts of data and run gargantuan simulations."

At last we are beginning to be capable of solving the apparently unsolvable, to predict and plan for the city in all its dynamic complexity and diversity. Pattern searching is a powerful way for digital technology to unravel the complexities of the city, and it is the same with the brain; "At first the foreign electrical signals are unintelligible, but the neural networks eventually extract patterns in incoming data. Although the input signals are crude. The brain finds a way to make sense of them. It hunts for patterns, cross-referencing with other senses."

As for the brain so it is with the city. Working with nature, guiding and steering and understanding what exists at the moment is the first step in planning the future city. The aim is to understand the city as a natural phenomenon in its self-ordering complexity.

Stephen Marshall, Reader in Urban Morphology and Planning at the Bartlett School of Planning, University College London, draws a parallel between the role of the urban planner and that of a gardener tending, say, a beanstalk. The bean can grow well on its own, but with the added support of a cane it will prosper even better – a happier beanstalk results in a happier gardener. This analogy emphasises that the role is ultimately one of stewardship, supporting and cultivating natural tendencies to the benefit of both nature and the human community. A memorably clear depiction, and one that is a world apart from the view of the architect and planner as essentially the visualiser and even inventor of the form of the future city, directing and controlling the vision for what the city ought to be.

However, nature is not as self-sufficient in the partnership as this analogy implies. It would not be accurate to suggest that, once given a supporting cane, the beanstalk could then be left to its own devices. After all, the length of cane, its position and its strength, the spacing between plants, their orientation, the soil condition and the microclimate are all part of an environment designed by the human mind. This kind of complex planning and



Old Oak Central Transport Super Hub - The Vision



ABOVE:

Farrells vision for Old Oak Common: Cross section of the transport interchange at Old Oak Common which will link HS2 connectivity from the north to the Great Western and West Coast Main Lines, Crossrail, West and North London Lines, Bakerloo and Central Underground lines, Heathrow Express, A40 and North Circular Road. Farrells study for the London Borough of Hammersmith and Fulham concluded that there is clear potential for a new place in London with the 'super hub' interchange becoming a powerful economic driver for growth and regeneration.



LEFT:

Low-level bridges: Just as 1950's plans solved only one aspect of the city at the expense of all else, the present day thinking on London's easterly expansion is severely compromised because we convince ourselves that the river and docks are still full of very large ships.



ABOVE:

High-Density mid-rise residential: Silo-thinking about daylight and sunlight limit our holistic city making such that our conservation areas couldn't be built at all today. Nor indeed could we repeat Notting Hill, Marylebone, Islington and Dulwich, or most of the centre of Paris. Our current rules are focused solely on merely one aspect of comfort at the expense of health, well-being and common sense in new housing provision

>>> will change movement and related placemaking in ways that Abercrombie could never have hoped to imagine. Driverless cars, dedicated cycle lanes and hire bikes galore, smart motorways and pedestrian crossings that adjust to demand, and congestion charging are all the beginnings of available products / solutions that will transform both city movement and city places, all due to the power of digital thinking, and it's just the beginning.

Today's siloed-thinking when faced with city complexity still goes on – for now. Extra runways and airport capacity have been tackled almost solely from the air travel/air business perspective, and railway operational (and funding / procurement silos) have left projects such as HS2 / Crossrail new station city making at Old Oak Common all the poorer. The efficiency of planning and designing our future cities will be severely limited unless we think more holistically and for example use the gargantuan powers of computers and digital thinking to balance and enable better and more joined-up decision making. We must determinedly model options that combine economic and political opportunities whilst also backing investment in practical ones like sequencing of operational and development integration.

The liveability of our future cities will be similarly constrained too. There is general agreement that growth in London is preferred to go in an eastward direction – and indeed, if you look east from the top of Canary Wharf tower you see vast areas of empty, unused land, primarily where docks and industry were located. But Abercrombie's era thinking is alive and well here 70 years or so afterwards! Though the docks are now empty the River Thames is still seen as a Grand Canyon divide imagined to be full of river traffic. We must reprioritise our thinking in favour of urban bridges like those in central and west London, to enable buses, taxis, pedestrians and cyclists to be able to locally and spontaneously cross the river. We need this to then urbanise and grow London eastward by over 1 million people (we are hoping to add a population the size of Birmingham to this part of London). Data gathering, measuring and simulation are a key way forward, as well as simultaneously abandoning fossilised, siloed and special-interest thinking.

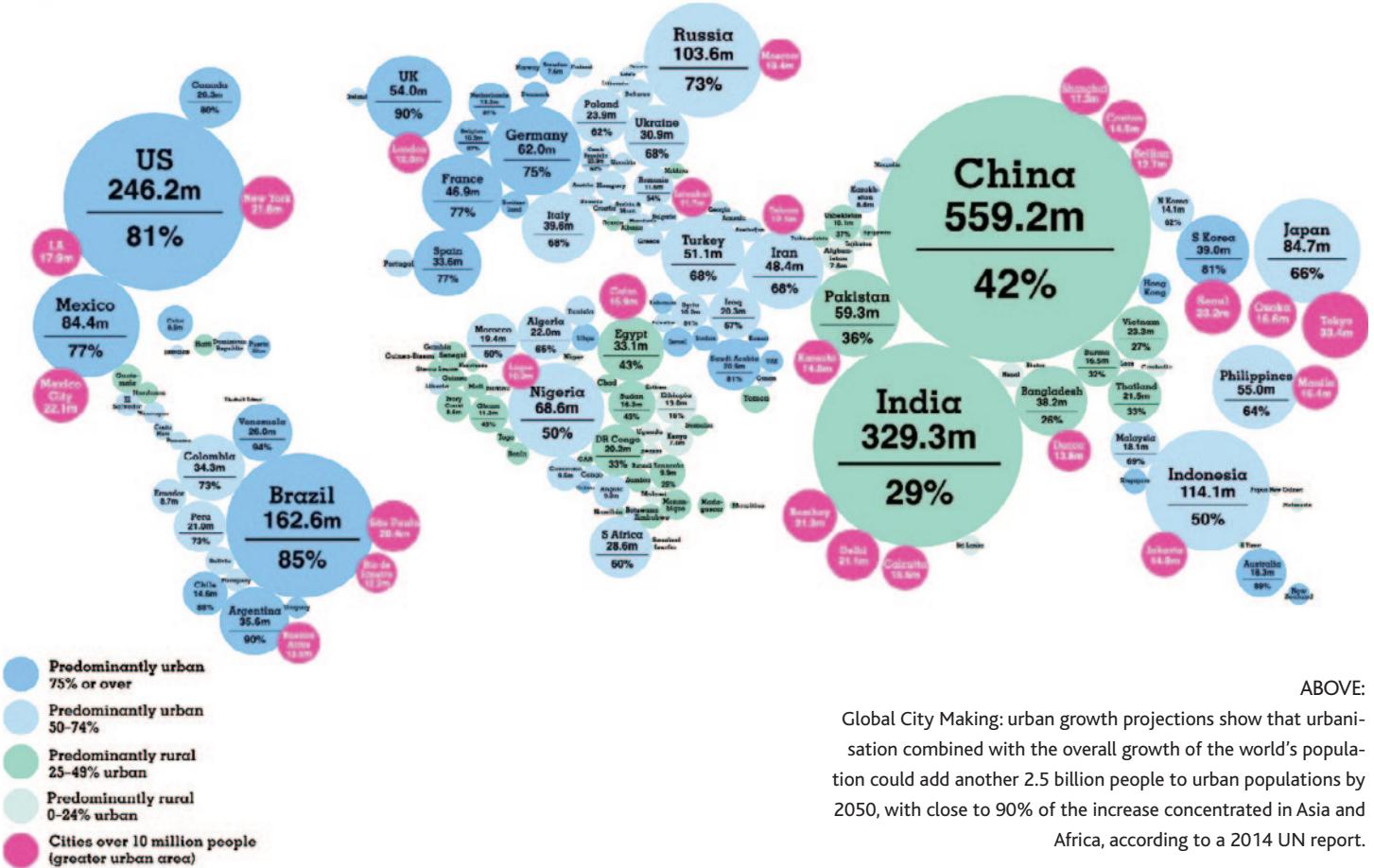
Fundamentally vital liveability is at stake. The river and historic docks could be, once again, a pleasurable place to be. Once, a little

over one hundred years ago, before the estuary was industrialised, there were nine piers, zoos and public gardens along the river used for pleasure boats, and vast numbers of Londoners holidayed in the estuary. Landscape regeneration is the first infrastructure to be invested in to make the east of London have the same liveability as west London and the "Thames Valley" beyond. This landscape link to liveability has today been developed into a considered proposal for London itself as a "National Park City". Led by Daniel Raven-Ellison there is now the beginning of a log of open spaces, trees, parks and rivers (along with the GLA's Green Grid work) that underpins the advocacy for connectedness with all the health benefits of liveability. Pollution and life expectancy, general well-being and addressing the existing daylight and sunshine rules all need to be connected up and mind-sets changed.

One of the important revelations of "London: National Park City" work is that, if done properly, it aids to the richness of ecology and nature provision through development and increased density, if done properly, aids the richness of ecology and nature provision. The myth of density equalling concreting over cities is exposed by measuring say the habitats that go with back gardens that are themselves a result of roads, houses and garden walls. Our work on mid-rise high density housing, for example, if extrapolated across London, can meet theoretical growth in population numbers quite easily – London is only half the density of Paris or Greater New York. So we need tools to compare cities objectively, to understand global city making and what works, what is healthier and what isn't, and what could add ecological richness with more trees and accessible landscaped public places.

All of this efficiency and liveability will undoubtedly help make for better sustainability. Smart city ideas are many and diverse but have yet to be integrated and connected or indeed advocated. The work of Simon Sturgis on embedded energy involves measuring true comparisons of building new versus adapting existing. This work needs to be more widely projected to include roads, bridges and all that makes up the infrastructure of what makes a city work. Coping with rising sea levels, greater rainfall and drainage cannot be done in isolation.

The real power of computerisation is not just about coping with complexity, it is also about explanation and advocacy, invari-



ABOVE:

Global City Making: urban growth projections show that urbanisation combined with the overall growth of the world's population could add another 2.5 billion people to urban populations by 2050, with close to 90% of the increase concentrated in Asia and Africa, according to a 2014 UN report.

ably via visual means, to enable much more widespread appreciation of what the city is and what options and decision making underpin what it could be. Part of our Farrell Review for government proposed 'urban rooms', some physical and some virtual, to be set up to familiarise and engage with inhabitants to understand the past, and reveal more fully any future proposals affecting their neighbourhood, village, town or city.

Conclusion

The growth of cities internationally is a phenomenon of our time. Indeed, urbanisation is accelerating at such an extraordinary rate that in the 21st century one of the main activities of humankind is city making. Not only are existing populations moving to cities, but the cities are increasing in population due to increased child birth and life expectancy. The urban population is already equal to the pre-WW2 total population and is expected to double in this century. London was the largest city in the world in 1900 and is still in the top league; but, by the end of this century, it will not be in the top 100. Yet London is projected to grow to almost double what it was in 1970 by the end of this century!

The views in this paper are coloured, maybe somewhat optimistically, by the many, many successful urban habitats. I do, however, absolutely acknowledge there are problem parts of cities, and problem cities. The stupendous rate of urban population growth means that the future success of cities is not by any means certain. What is growing are slums. Slums, the home to migrating poor and the new poor, constitute one third of urban territory worldwide on average, and this statistic hides the fact that in some cities it is even higher. In Mumbai, for example, two

thirds of the population are estimated to be slum dwellers. There are also the effects of war which are intrinsically seen more and more in urban centres, partly for symbolic reasons but also because that is where the collective culture dwells and where the soldiers and civilian populations invariably are. Cities are becoming the frontline battleground, unlike the open countryside warfare in the days of Waterloo. From Hiroshima, the London Blitz and the mass bombing of German towns in WW2, today Raqqa, Bagdad and Kabul are all cities subject to so much wartime destruction. The increase in global weather events additionally means that there will be immense inter-relationships affecting the urbanisation of the planet. Sustainability, economic and political reactions will surely affect all of this with potentially more slums and more conflict.

However, my more optimistic view of cities is based on the astonishing progress of the last 50 years, particularly when comparing London then and now. When considering war-torn cities globally after WW2 so many have not just recovered but have improved well beyond that: St Petersburg, Berlin, Hamburg, Manchester and so many more have gone from almost total destruction to astonishing splendour in their physical presence as well as their cultural and economic wellbeing. Like many others, I have maybe inadvertently been a student of cities in my worldwide travels: New York, Philadelphia, Hong Kong, Sydney. Again the list goes on and on, with towns and cities that are celebrations of our species in their urban habitats.

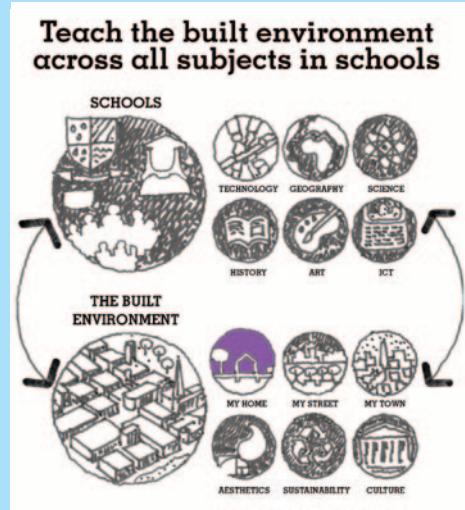
With better understanding of urban habitats, the vast changes of the 21st Century will not just be even better for new digital technologies but they will be critically essential to cope with the growth and complex changes that the future holds. ■ >>>

Proposals:

In 2013 I was asked to lead a review (*The Farrell Review of Architecture and the Built Environment*) by the government. Many of its proposals are increasingly valid five years on. The strongest of these is to do with concentrating on the widest, most democratic, involvement of "many hands" and the deeper and wider understanding that place making and all the combined benefits of the city (including architecture and design which have a secondary role) derive from city making and "over time", indeed over long, deep time.

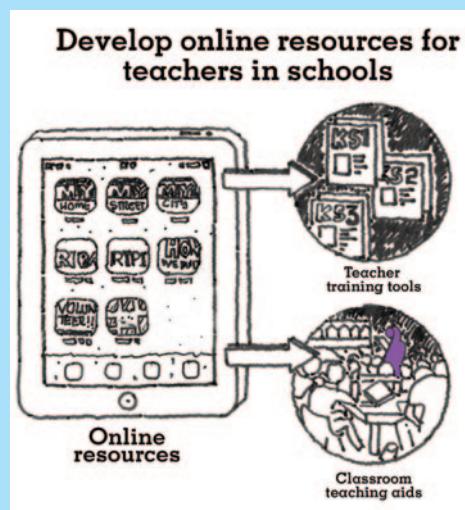
Children's Education

- Teach the built environment across all subjects in schools
- Develop online resources for teachers in schools

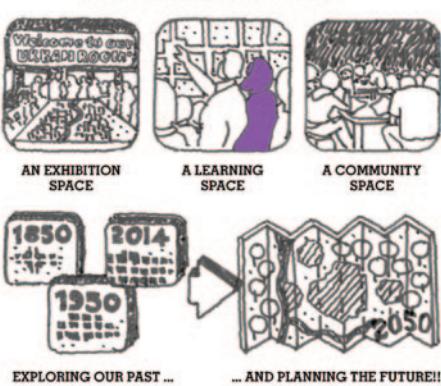


Outreach & Skills

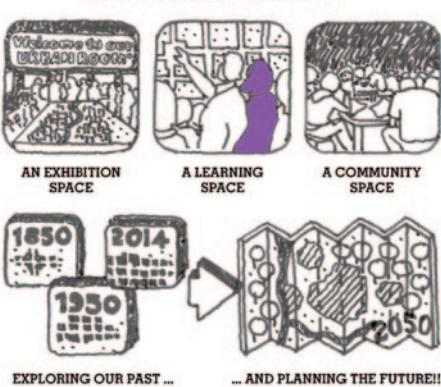
- Every town and city should have an urban room that is physical and/or virtual which is a place where the history of "PLACE" and future changes are widened to the most extensive and inclusive audience
- All should "champion the civic"



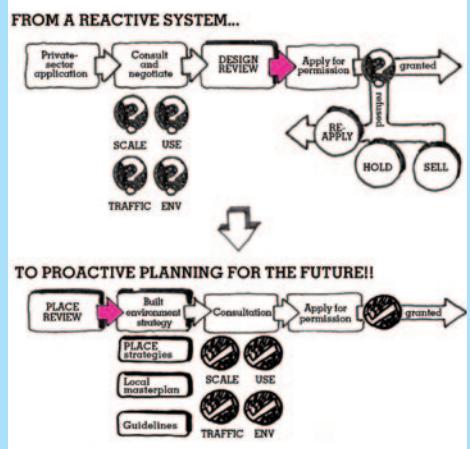
Every town and city should have an "URBAN ROOM"



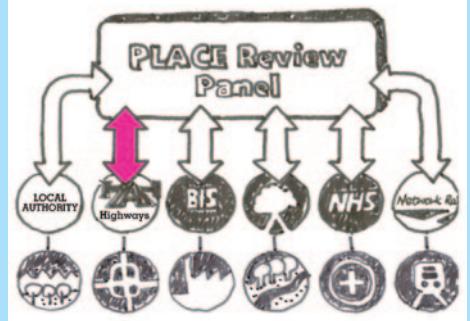
Every town and city should have an "URBAN ROOM"



Make the planning system more proactive!



Every public body should have access to a PLACE Review Panel



Professional Education

- A common foundation year for all built environment students

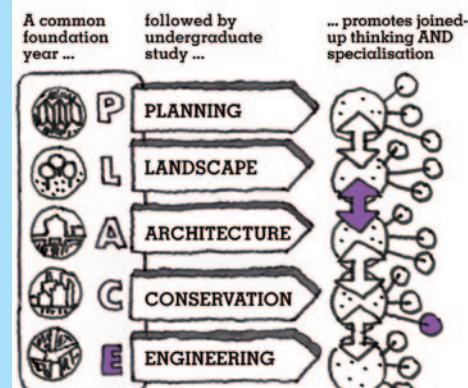
Planning for the Future

- Make the planning system more proactive
- We should continue to expand "PLACE Reviews" and every public body should have a "Place Review Panel"

Making the Ordinary Better

- Place as "client" – continue to strengthen the role of public realm, particularly our streets and roads.

A common foundation year for all built environment students



PLACE institutions & agencies to promote success overseas

