ThinkPiece

# Urban Tech
# Connecting property data to drive real estate value

**Keywords**

Human behaviour, Integrated Urban Modelling, Place Intelligence, predictive analytics, property industry practice, urban technology.

## Introduction
### The pull and push of 'Urban Tech'

The real estate industry relies heavily on personal capital, tacit knowledge and interpersonal relationships. The human dimension is at the heart of it all. However, in a digital age, the capability of technology to provide fresh insights and create new services presents significant opportunities to transform traditional practice.

Will this opportunity be seized? If past progress is an indicator of future success then the answer is "probably not". Being characteristically risk averse, the majority of real estate practitioners have been relatively slow in their uptake of technologies that might accelerate or even avoid some processes that still rely on face-to-face encounter and human instinct. The pull for technological solutions from industry has not therefore been strong and, as a result, the push from tech companies has struggled to gain ground.

Despite this, it is our belief at Space Syntax that the situation is changing quickly and it is only a matter of time until digital technology changes the workings of the real estate industry in significant ways. This paper articulates the potential of what we believe is a rapidly emerging field of 'Urban Tech' and describes how new digital processes can complement, enhance and perhaps even transform traditional practice.

## The opportunity

### Generating and embedding ‘Place Intelligence’ in property practice

Our proposition is built on two ideas:

- first, the creation of ‘Place Intelligence’: insights into the ways that real estate assets are used by their occupiers, employing advanced computing techniques to connect diverse property datasets

- second, embedding Place Intelligence in the everyday activities of real estate professionals to support better decision taking.

At the heart of the approach is an enhanced understanding of human behaviour inside buildings and in the urban spaces between them. We believe that the long-term success of real estate transactions is in the creation of places that work for the people that use them: places that foster workplace interaction and provide social amenity.

## Why now?

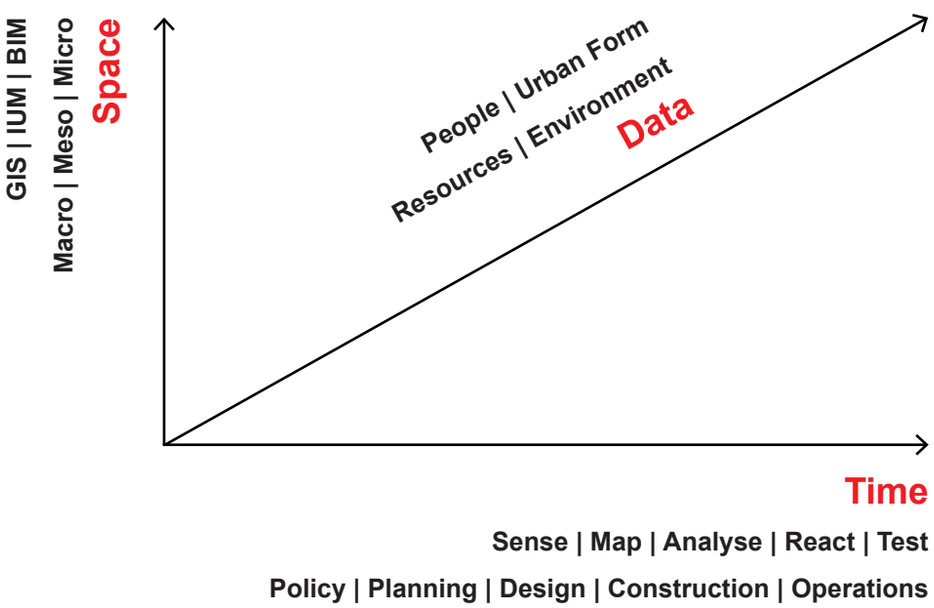
### Because something has changed

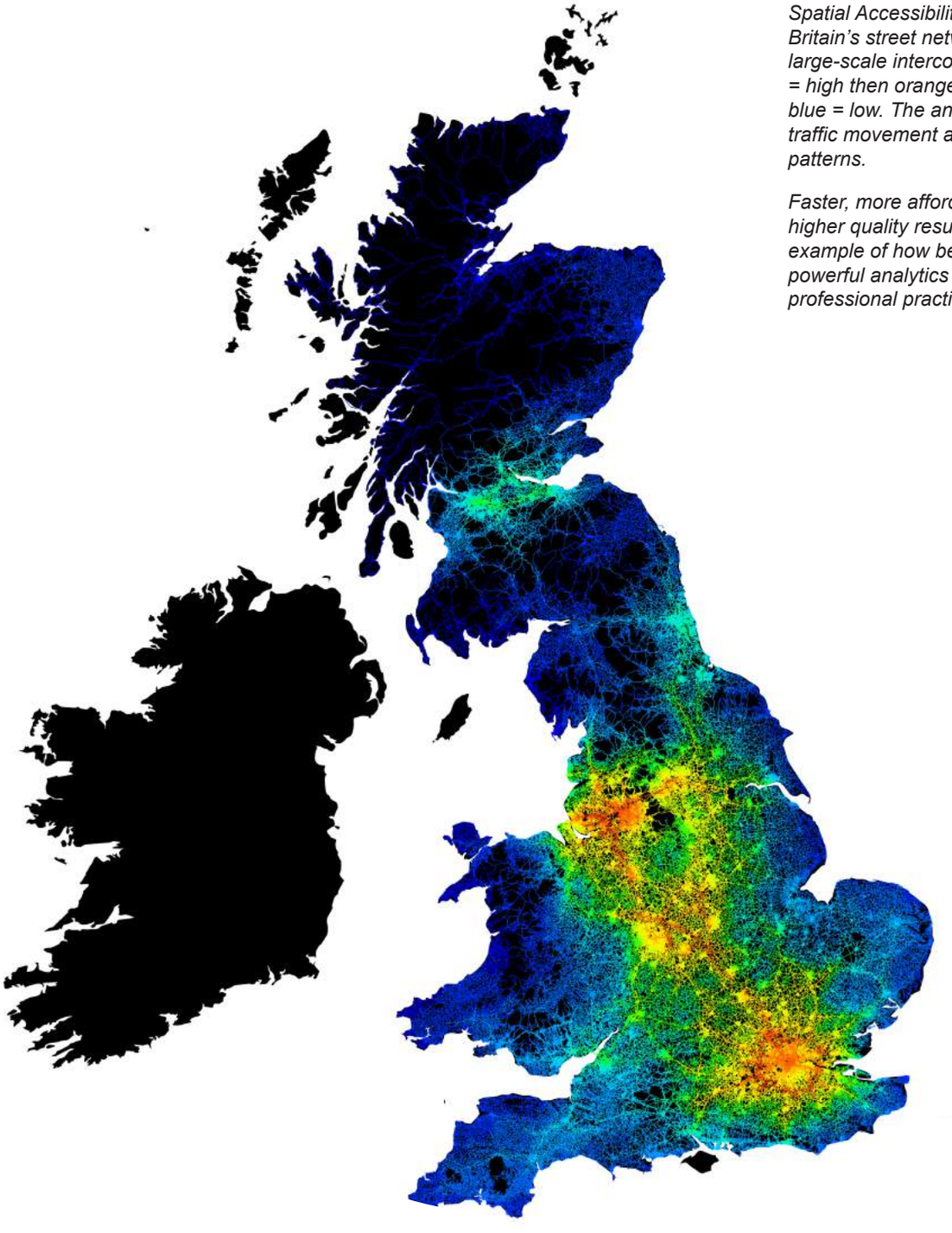
The challenge for many years has been in the gathering of sufficiently robust information on how people behave: where they are and how they interact with others. A related problem has been how to analyse this information: how to spot a building or a place that works well from one that doesn’t. Ultimately, the difficult task has been how to link such knowledge back to investment decisions on questions relating to location choice, use type, layout design and management regime.

Actively engaged in the field for over a quarter of a century, Space Syntax has seen at first hand the challenges in gathering, processing and interpreting data for the property industry. Until recently, data has had to be searched for, paid for and waited for. This has affected the scope and timeliness of subsequent work. It has also meant that the process of data gathering, analysis and modelling has been largely bespoke to each project, and this has worked against the creation of standardised approaches.

But recently the situation has changed. In the last two or three years, we have seen data become prevalent, affordable and increasingly real time. In parallel, analytics and processing capabilities have significantly improved. These developments mean we can work faster and at a higher level of granularity. They also mean we can pre-process large urban models and extract site-specific analytics in standardised formats.

Our view is that these advances will have important implications for real estate practice. Embrace them and the existing property industry can benefit from new and better insights on user behaviour, to the benefit of investors, owners and tenants alike. Avoid them and the chances are that others will not, which could see the emergence of a new kind of digital property practice to threaten established firms. AirBnB’s digital disruption of the hotel industry is, we believe, just the beginning of future radical change.





*Spatial Accessibility Analysis of Great Britain's street network showing large-scale interconnectivity where red = high then orange, yellow and green to blue = low. The analysis explains both traffic movement and employment density patterns.*

*Faster, more affordable and yielding higher quality results, this model is an example of how better data and more powerful analytics are transforming professional practice.*

## The importance of spatial analytics in generating ‘Place Intelligence’

Space Syntax is keen to anticipate how improved data and analytics can benefit the property industry. Our approach to human behaviour modelling is built on ‘spatial analytics’: how the layout of space and location of attractors has a fundamental influence on the way people move and interact with each other in buildings and cities. In practice this means tagging property asset and human behaviour data to spatial coordinates, then – and this is the crucial part - analysing the networks of spatial connections (the rooms, corridors, streets and spaces) that link the data together.

This space-based method, pioneered at University College London since the 1970s, has already had a large impact in the fields of urban planning and design and a small but significant one in real estate practice. Space Syntax’s analysis has been behind the design of Broadgate, the regeneration of the Southbank Centre, the Elephant and Castle, St Giles and hundreds of other developments in London and beyond.

While many in the property industry understand the importance of spatial tagging, it is the spatial linking functionality of our models that really matters. Linking is critical because the spatial network of a building or a city is not simply part of the background. On the contrary, it is where people, assets and behaviours interact, where the social and economic transactions that are captured by datasets actually occur. In this sense, spatial networks are critical elements of property infrastructure, conduits carrying the flows of people, energy, data and goods which support urban outcomes. Well-designed layouts facilitate flows and interactions. Poorly-designed ones stifle movement and suppress transactions.

Once established, spatial networks are difficult and expensive to change. This means that it is important to get them right first time. It also means that, if you understand how they work, spatial networks provide a highly effective platform for the long-term modelling of property performance. Understand the spatial network and you begin to understand the transactions that occur within it.

For example, research by Space Syntax has shown that spatial layouts influence a wide range of socio-economic factors:

**Urban movement**, such that spatial network models are now widely used as strategic forecasting tools for investments in vehicle, pedestrian and cycle infrastructure.

**Land use vitality**, where the effectiveness of use-type decisions is deeply influenced by spatial location.

**Crime**, allowing risk to be identified and safer places to be created.

**Property value**, demonstrating the influence of spatial networks on land prices and property yields.

**Environmental impact**, highlighting the contribution of spatial planning and design to resource management and carbon emissions.

## Defining data & combining datasets with ‘Integrated Urban Modelling’

**People** - Human demographics, including population, employment, education and activity patterns.

**Urban Form** - Infrastructure networks, including buildings, streets, utilities and public transport.

**Resources** - Asset flows, including transport, energy, water and waste.

With the recent surge in the quantity and quality of property data available, we find it helpful at Space Syntax to categorise datasets in as simple a format as possible:

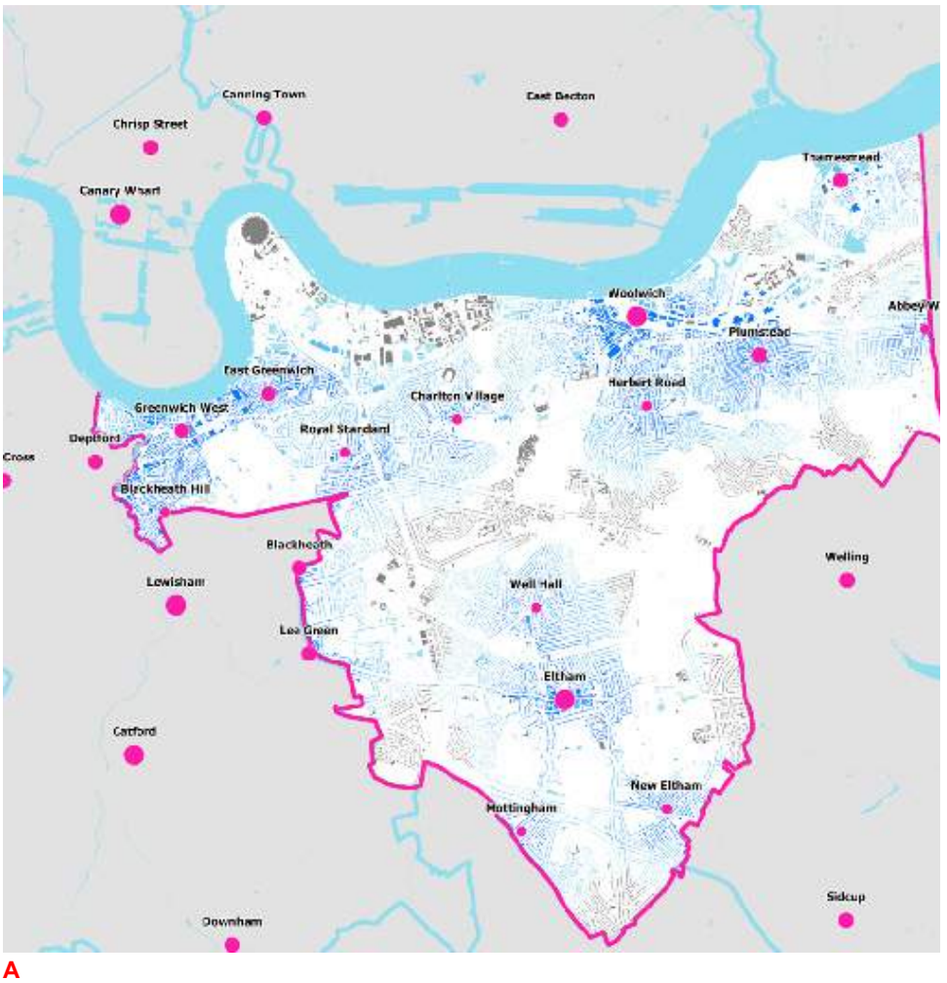
**Environment** - Natural features, including climate (sun, wind, rain), topography and hydrology.

These different datasets are tagged to the spatial network model, after which multivariate analysis is undertaken to study relations between the data: associations and correlations that demonstrate how the different factors combine to influence each other, for example, how street layout influences the performance of shops and how this is affected by the density of people living and working in the vicinity. We call the product of this process an ‘Integrated Urban Model’.

The Integrated Urban Model has the ability to include live, open and commercially sensitive or proprietary data. It is also possible to work at different levels of granularity: from the way that different regions of the same country work to variations in the performance of two departments in the same building, or two shops on the same street.

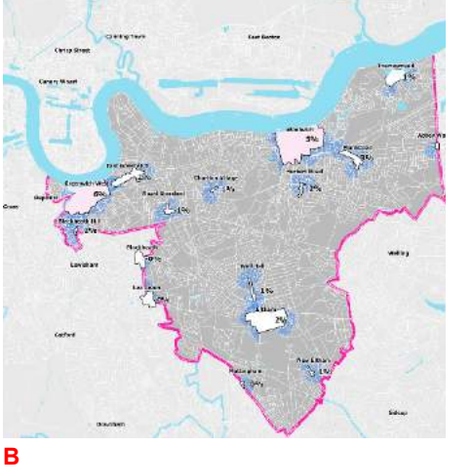
**An Integrated Urban Model in operation**

Analysing spatial location and transport accessibility in the Royal Borough of Greenwich.



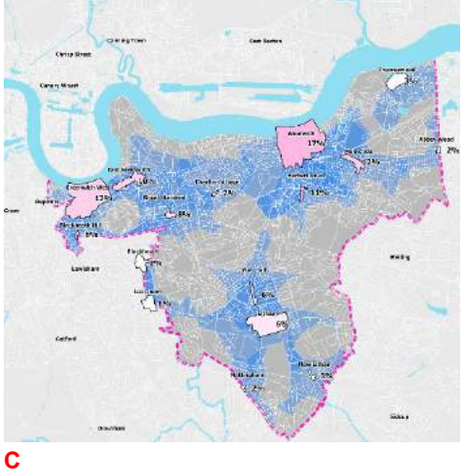

A

**A** Analysis showing the number of town centres within 15 minutes journey by bus or on foot from every household.



B

**B** 15 minute walking catchment from town centres.



C

**C** 15 minute bus catchment from town centres.

## A SMART process that benefits multiple users in multiple ways

By using the spatial network of the city and its buildings as a data framework, Integrated Urban Modelling offers a new way to gather, display and analyse real estate data. The approach ensures that previously unconnected datasets are brought together, for example on rental values and health outcomes, on air quality and educational attainment. Spatial network analysis provides a 'common language' that fosters collaboration.

We have identified four principal use cases that cover a range of physical scales, professional activities and stages in the property cycle from initial policy making and planning to design, construction and operations.

### Performance Analytics

Local authorities and facilities managers can see, in real time, how buildings and places are performing. To some extent this is already happening in city control rooms worldwide. Crucially, predictive analytics can be run more quickly and at much lower costs than before to test the impacts of proposed changes, be they, for example, long-term development plans or temporary road closures. These measures inform the **strategic management and economic planning** of property portfolios.

### Location profiling

Locations can be identified that match a set of user-defined criteria. For example, a commercial property location can be detected that is close to a set of complementary industries and which matches other desired social, economic or 'place' characteristics. Catchment analysis can identify the numbers of people or jobs within a certain time or distance of a particular location. This analysis can then be used to calculate the number of potential users of a new development.

### Design Feedback

Architects and urban planners can employ Integrated Urban Models as design tools, using predictive analytics to quickly and effectively model the social and economic outcomes of spatial layout and land use attraction proposals. Multiple scenarios can quickly be tested and comparatively evaluated.

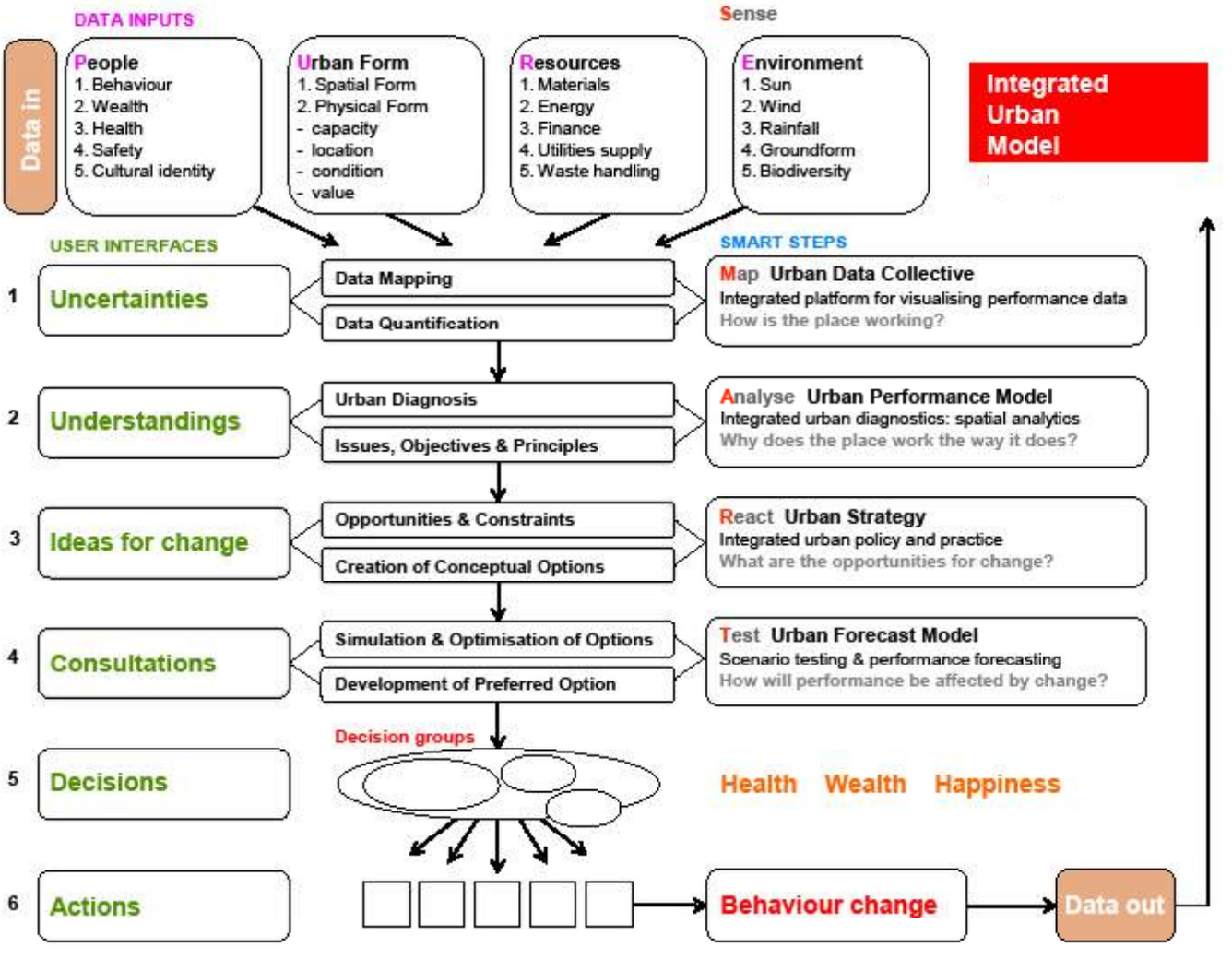
### Longitudinal Research

For long-term operations, the approach allows a consistent and stable measurement of the urban environment. This helps city decision makers in the private and public sectors embark on more accurate **urban performance analytics**, allowing a finer-scale understanding of how the functioning of buildings and urban places changes through time. Large-scale, **longitudinal spatial studies** can examine the effects of policy interventions such as opportunity area developments, key regeneration projects or new infrastructure investments, whether large or small scale.

What is common to the different use cases is a process that involves **sensing** data, **mapping** it to make it visually clearer, **analysing** patterns within it, **reacting** to the analysis through the creation of policies or proposals, and **testing** those ideas with stakeholders using predictive modelling.

**S**ensing
**M**apping
**A**nalysing
**R**eacting
**T**esting

This SMART method is, in our view, key to the effective application of digital technology, bringing together organisations that may otherwise focus on only one or two stages of the process.

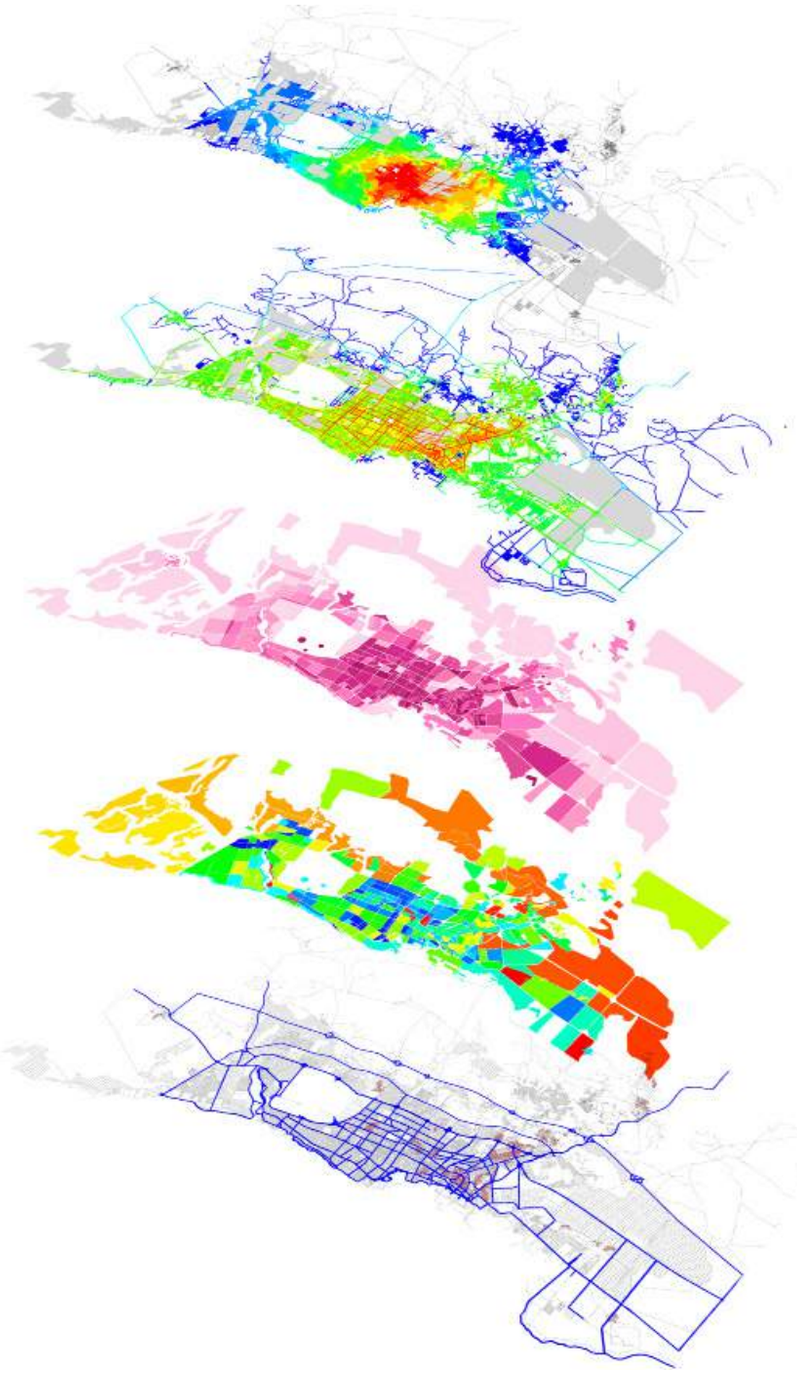


## Where next for Urban Tech and real estate practice?

The ideas set out in this paper are less speculative than substantive, formed out of Space Syntax's experience in developing and applying Integrated Urban Models in real estate projects for over 25 years. During this time, we have continuously refined our methodologies to produce analytics that better capture and understand the planning and design drivers of property performance. Our experience shows that the Place Intelligence created by the approach leads to better decisions in the short and long terms.

Nevertheless, the route taken by Space Syntax has not yet been followed by many others. Why should this be? In reality, the process of creating an effective property performance model – one that can be rapidly deployed on real-world consulting challenges rather than simply paraded at academic and industry conferences - has been highly skilled and labour intensive. More than this, it has been heavily reliant on tacit knowledge gained through extensive experience. This is difficult both to replicate and to scale. However, our belief is that the rapidly improving nature of data and analytics will transform the situation and take property modelling from being a bespoke luxury process to one that is commonly practised. Much work will be required to make this happen but the opportunity is clearly there.

We anticipate that Integrated Urban Modelling and the digital Place Intelligence it creates will be central to real estate practice in the future. In order to take full advantage of the opportunity, our view is that the property industry should open up to Urban Tech and explore what can be gained by embedding it in everyday practice.

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