Editorial

B Urban Analytics and City Science

Urban analytics defined

EPB: Urban Analytics and City Science
2019, Vol. 46(3) 403–405

DOI: 10.1177/2399808319839494
journals.sagepub.com/home/epb
SAGE

Suddenly you realise there is a new phrase or term that everyone is using and you wonder where it came from. Urban analytics is one of those clichés that seems to effortlessly roll off the tongue as though we have used it all our lives. It strictly originates from 'urban analysis', but it is more than this for the term analytics implies a set of methods that can be used to explore, understand and predict properties and features of any system, in our case of cities. You might think that for a journal that retitled its subtitle as urban analytics some two years ago, we should have explained what we meant at the time but as with many things, it then seemed appropriate. The rationale for defining it now is that it is ever more popular and is beginning to be used quite widely. As such, its usage is changing. In explaining the change in subtitle from Planning and Design to Urban Analytics and City Science, we did not define any of these terms but simply stated that 'Our focus will continue to be on the application of quantitative, computational, design and visual methods to the spatial and morphological structure of cities and regions' (Batty, 2017: 6). Some readers contacted me at the time questioning why we had relegated 'design' from the subtitle and I attempted to reassure them that we had no intention of abandoning our interest and links to design, but also pointing out that design had always been a very specific focus of the journal and many papers which could loosely be classified as relating to design, never came within the remit of the journal. Our change in focus was more one of how the field of modelling and methods in planning and design was evolving. If you look at the journal since we made this change, little, in my view, has changed – the changes have been subtle and of emphasis – and that is always the way we wanted it to be.

There is no correct way to define urban analytics, but we do need to unpack the phrase somewhat, at least because it is being more widely used. One way of doing this is to catalogue how others are using the term. The recent book *Urban Analytics* by Singleton et al. (2018) is as good a place to start as any, particularly as there are accolades to the book from researchers who have been involved at various stages in editing and writing in this journal. In one of these, I wrote 'Urban analytics is fast emerging as the core set of tools employed to deal with problems of big data, urban simulation, and geodemographics', while Michael Goodchild defines it as 'new kind of urban research, one that exploits the vast new data resources that are becoming available from social media, crowd sourcing, and sensor networks…' Contained in Goodchild's quote is the clear and unequivocal notion that urban analytics is about the new world of big data, a world that has certainly emerged in the last decade with the continued miniaturisation of computers to the point where they can be embedded into the very fabric of the multitude of systems that we deal with in urban research. In fact, data analytics (or rather data analysis) has been used for a long time. It was used nearly 60 years or so ago, the logic of all this being beautifully articulated by the father of data analysis, John Tukey (1962), in his famous paper 'The future of data analysis'.

There is no entry for 'data analytics' in Wikipedia as yet, but the page on data analysis immediately throws up the term of predictive analytics. The definition of 'analytics' in Wikipedia (2019) says it all: 'Analytics is the discovery, interpretation, and communication of meaningful patterns in data'.

When we decided to subtitle the journal with urban analytics, we were also mindful of the fact that analytics is only part of the story and the other term that had emerged slowly but surely since the journal began was the term 'city science'. Arguably urban and regional economics, modelling, theory as encapsulated in the context of regional science, itself a term with considerable ambiguity, should be a core part of urban analytics. But also to guard against our focus as being purely linked to developments in computation and data analysis, in this journal, we consider the term city science to be a better focus. It is already clear that this somewhat wider remit is important for many who are involved in simulation and design involving cities at different spatial and temporal scales, would not consider themselves as being part of the emergent field of urban analytics. The science of cities goes back to social physics as reflected in notions about scaling, rank-size, allometry and so on, and its analytical focus through fractal geometry, chaos theory and complexity, and in this sense, exists in parallel to urban analytics. The key issue of course is to pose the question: 'to what extent should urban analytics reach out to embrace these ideas as well?' reaching out perhaps as far as more conceptual ideas about the extent to which we can engage in prediction and planning through applications of these tools and methods.

It might appear somewhat parochial to continue to define the extent of any new field that cuts across existing intellectual and professional terrain, but it is important in terms of mobilising resources to progress these ideas. Quite recently, within the last year, the newly founded Turing Institute (2019) has defined a programme in urban analytics that has the potential to embrace the wider concerns voiced here. So far, the programme contains researchers from key UK universities that largely root their research in understanding cities better, but there is little focus so far on how the models and methods that are being researched under the rubric of urban analytics might progress to help us generate a better quality of life in cities through urban planning. But using data science to improve the human condition is the aim of the Institute, hence the need to define how such programmes can best help organise the field and provide new ideas that will underpin dramatic improvements to the way we design future cities.

There are now hundreds of books on data analysis but few in our own field that really grapple with the application of these ideas to spatial analysis, urban and regional modelling, geodemographics and the range of real world problems that have formed the core of the material in this journal over many years. This is largely because there is an enormous mismatch between the kinds of data that are now being generated routinely using sensor networks and social media which now form the heart of big data analysis and the sorts of data that are needed to think about cities more strategically. In short, most of our city science is about how cities are structured not in the very short term but over much longer terms, over years and decades, even over centuries. This difference in temporal scale is, in my view, the most significant problem that urban analytics has to deal with in that our theories of how cities are structured and how their citizens behave in highly routinised daily contexts are barely developed at all so far. In short, we have all the tools to deal with data generated routinely in real time but we have none of the requisite theory, other than the most pragmatic where we have bits and pieces of a science. The real challenge of urban analytics is to make sure we invent this science as well as working with ways of using it to plan cities better.

Let me spend a bit longer on this question of temporality, as this is key to our thinking about cities. To a very large extent, most of our theory about how cities are structured which

is relevant to current methods of urban planning is spatial, dealing with variations in how people are located, how they travel, how they relate to one another, and so on, at any cross-section in time. Some transportation modelling deals with detailed temporal forecasting but even that tends to be cross-sectional in nature, modelling peak hour flows rather than how people generate movement patterns continuously and continually through time, although there are some examples of agent-based and micro-simulation models that do attempt continuous simulations of movement. In fact, it is probably fair to say that much of our spatial theory about cities is being rapidly made obsolete as we move headlong towards a digital society, as cities become ever more complex, and as we invent new ways of behaving using the new media. In some respects, although we now have the tools to deal with big data being streamed in real time as well as big data that is collected more conventionally from questionnaire survey, we do not have robust theory to make sense of all this, either for analysis of the very short term or even the longer term. To an extent, the role of prediction is ever more problematic when it comes to explaining behaviours in complex human systems.

The challenge then for urban analytics is to move beyond data analysis per se. In fact, there is even a role for urban analytics in dealing with small data, extracting the jewels from data sets that are not necessarily generated in real time, perhaps abstracted in a secondary sense from other primary sources. But there is a bigger role in thinking about a theory of the urban – we have called it city science – that embraces the new data and provides a clear test-bed for applications to problems relating to the big questions of our time, inequality, aging, the future of work and so on, all of which have enormous spatial as well as temporal variations that need to be understood and explained. And last but not least, urban analytics should deal with Environment and Planning, the main title of this journal still, for therein lies the motivations for developing these ideas in the first place, so we can provide more sustainable and liveable cities than anything we have achieved or even attempted so far.

Michael Batty
The Editor

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

References

Batty M (2017) The future journal. *Environment and Planning B: Urban Analytics and City Science 44*(1): 6–9.

Singleton AD, Spielman SE and Folch DC (2018) *Urban Analytics*. London: Sage.

Tukey JW (1962) The future of data analysis. *The Annals of Mathematical Statistics 33*(1): 1–67.

Turing Institute (2019) Available at: www.turing.ac.uk/news/alan-turing-institute-launches-new-research-programmes-urban-analytics-and-data-science (accessed 3 March 2019).

Wikipedia (2019) Analytics. Available at: https://en.wikipedia.org/wiki/Analytics (accessed 3 March 2019).