The expert view: thoughts on urban street networks

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Interviewee: Adam Millard-Ball – Professor of Urban Planning at UCLA Luskin School of Public Affairs

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Streets in Bordeaux, Jaipur, New York City, Tokyo and Utrecht (photos: G Byatt)

Adam,

Thank you for making the time to talk with me about your research towards urban planning and development, in particular relating to street networks and design.

Could we start with a brief overview of your background and your activities at the Urban Planning Department of the UCLA Luskin School of Public Affairs? I want to mention that I found one of your recent co-authored papers, about the creation of a high-resolution global time series of street-network sprawl, published by Sage Journals in January 2025, very interesting to read (along with some related journal articles, including an article in Bloomberg published in January 2025 about how street design can make a life-saving difference for city evacuations from disaster hazards, and one in StreetsBlog USA also published in January 2025).

Adam: *Sure. I teach research and I have been at UCLA since January 2021. The core of my current research is what the transport sector can do to help mitigate climate change. Much of my work is about the intersection between transport policy and environmental policy.*

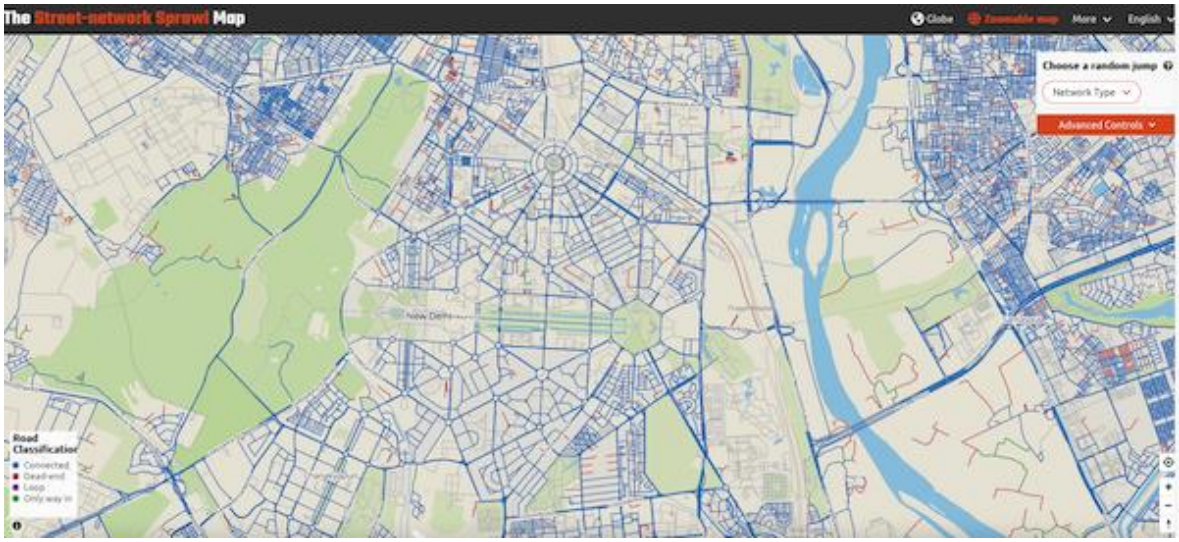
The project about street-network sprawl that you have mentioned, which has been reported on in a few different places, including the media outlets you referenced, is a long-standing project that I have been involved in with Chris Barrington-Leigh who is at McGill University. The crux of our project, now in its second phase, has been to focus on the underlying structure of cities through their street networks. A key point of our research is that, once a city's network of streets is laid down, it is hard to change it. Buildings and structures come and go in cities, yet there is evidence all around the world dating back centuries of how many street layouts remain constant. We are interested in how street networks develop, how they are formed and whether they can change over time to adapt to changing needs.

Through this project with Chris, one of the aspects I am looking at is how streets affect and influence different social outcomes and their role in shaping the sustainability of the city in the long run. Chris and I are also looking at how streets affect the ability to escape from areas in disaster hazard situations (which relates to the Bloomberg article you mentioned, and a post on the Luskin School UCLA website).

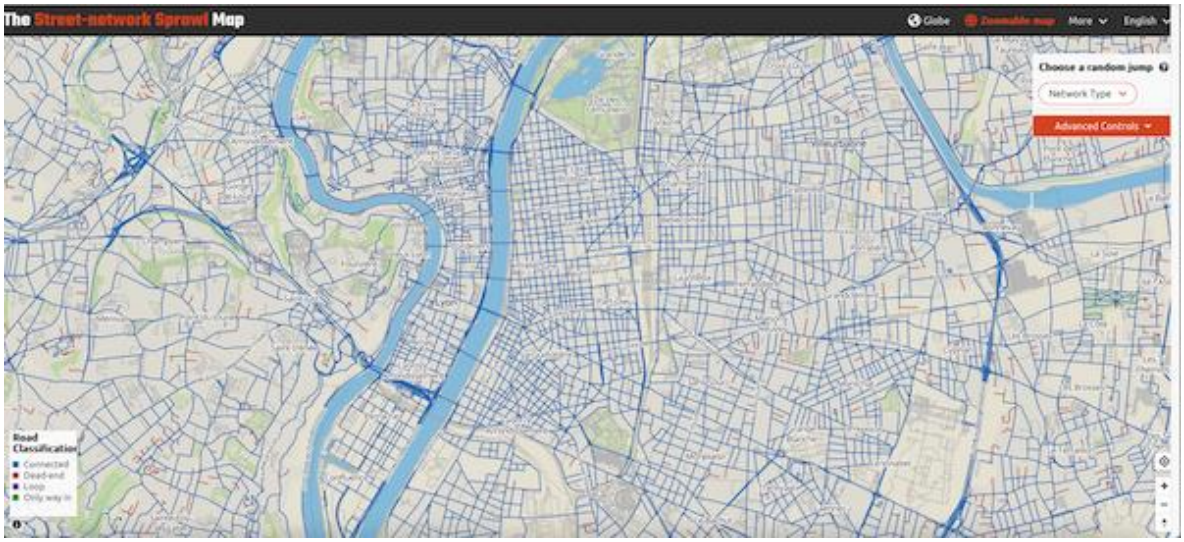
Gareth: Thanks for this context, Adam. I have had a good look through the latest online Street-network Sprawl Map. Do you have any plans to extend it further, noting that the dataset is free to be used and built upon by others? From my own review I have noted that the maps cover small towns as well large cities all over the world – for example, I have looked at the street network of Delhi, Hyderabad and smaller cities and towns in India and contrasted them with cities and towns in France and Chile.

How do you think your research findings, and the data you are making available online about street networks, can be used by urban policy makers and planners on all continents?

Streets in New Delhi, India (image taken from the Street-network Sprawl Map website)



Streets in Lyon, France (image taken from the Street-network Sprawl Map website)



Streets in Valparaiso, Chile (image taken from the Street-network Sprawl Map website)

Adam: *We hope that the online Street-network Sprawl Map has global application. Planners and other people can look at the street maps for their own city or town and compare and contrast them with layouts of other streets of cities and towns – those they know and others they are not familiar with. Maybe it can give them ideas for their local environment, for different ways to build and improve connectivity. For example, in the US and sometimes in Europe planners tend to think of connected streets as a grid layout, which can indeed work, whilst we know that there are many other ways to achieve well-connected streets. Japan provides a certain approach to street networks, as do medieval cities in countries such as Italy and Spain, for example.*

Part of the reason for updating the map and releasing new data online is that we want to provide the latest data whilst not trying to predict how people will use it. We hope people can make use of it in ways that suit their context based on their domain and focus area. Perhaps it can be used to look at how streets are associated with different environmental and social outcomes, such as how people travel and move around, and the social capital that streets foster (or not). Perhaps it can be used as part of analysis into how street networks could be rebuilt after disasters.

Gareth: It will be interesting to see how people make use of the data, Adam. Perhaps feedback in due course can help to provide insights into its use.

Just on the point you mentioned about looking at how streets are associated with different environmental and social outcomes, I have reviewed the challenges of dealing with extreme heat in India's cities, and also the smog problem that persists in wintertime in north central India (including Delhi and nearby cities), and this has given me an idea to look at street networks as part of this analysis.

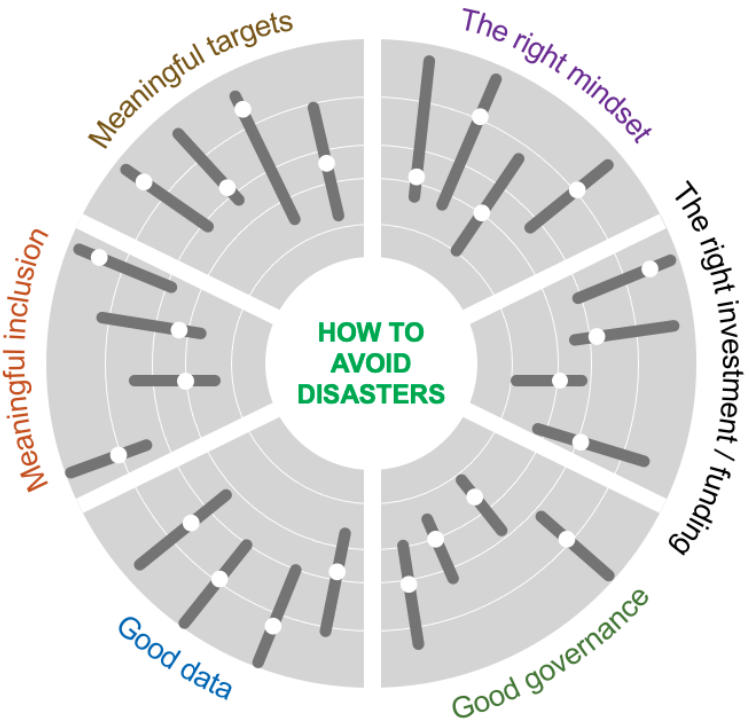
Going back to street network design principles, I remember a piece published in The Economist in December 2022 titled "The decline of the city grid". The piece discusses the rise of digital mapping and how orderliness of street systems can be calculated, citing work from the University of Southern California to create a measure of city "entropy", looking at the degree of consistency in the direction of streets in over 100 major cities around the world. We know that street grids date back a few thousand years – they have been implemented for a long time. It also talks about the drawbacks of cul-de-sacs. The article proffers an opinion that street grids still have a valuable role to play, in the right context.

In the StreetsBlog USA article you talk about the value of planning good pedestrian access and walkability. Jane Jacobs said in "The Death and Life of Great American Cities" that blocks should be short, and roads not too wide, to make them easy to walk through and to create space for businesses. There are some good apps that help people to provide crowdsourced data about walking routes, such as Walk21.

Adam: *As we were discussing just now, street network connectivity can be achieved in a variety of ways. It's important to have pedestrian connectivity in our street networks, which can be easy to do when street networks are being built; it is much harder to achieve once they are in place and once houses and other buildings are located on them. It's also important that businesses have good economic possibilities enabled through street network design.*

Gareth: On your point about reviewing how street networks could be altered after a disaster event occurs in a city or a town, I co-lead an initiative called Disasters Avoided, which amongst other focal areas includes how cities and towns can reduce their vulnerability to hazards such as wildfire, flooding, storms and earthquakes. Ilan Kelman, Ana Prados and I have developed a six-point model for avoiding disasters. I think the principles of our model can align to the thinking around street network design, starting with the right mindset and working round investment, governance, having good data to inform decisions, involving everyone and having targets to track.

The Disasters Avoided model – by G Byatt, I Kelman and A Prados



Gareth: Does analysis of street network sprawl lend itself to looking at short-term and tactical changes to streets as well as long-term changes, which I appreciate are a lot harder to implement and require many more considerations?

Adam: *Tactical innovations have their place in urban planning as short-term trials and perhaps forerunners to longer term change. Tactical measures can usually be retrofitted to streets with relative ease, the primary challenge to implementing them usually being political (for example, turning a street into a pedestrian-only route for part of the time, or narrowing it to cars to provide space for bicycles). Street networks are the skeleton of the city, which is why they are hard to change.*

Gareth: There must be many complexities to changing a city or town street network, from having to look at land ownership rights to the services that exist underground and above ground (I can think of some streets in which the utilities could benefit from

a major upgrade, if funds were available) and how a street network change can impact businesses and the local economy.

Adam: *For sure, there are many aspects to consider, including property rights and ownership and the transaction costs of coordinating property owners who live or run businesses in specific streets. Decisions about utilities are also necessary.*

Gareth: Continuing on the point about the analysis of street networks as part of urban planning, are there any particular examples or trends that are worth considering and reflecting on?

Adam: *We should remember that some countries and localities have always built connected streets. Japan's cities and towns are a good example of this. Latin American cities have been well connected for many years, but in some of them nowadays there is a trend towards less connectivity. The reasons for changes like this can be complex, for example it may be linked to fears of crime and the state of public services leading to the creation of gated communities for people who can afford it (which links into socio-economics).*

In terms of policies to change street networks, one of the potential uses for our data is for urban planners to evaluate systematically what types of urban policies have increased connectivity. For example, in the UK there is planning guidance dating back a few decades which called for a move towards "permeable streets" for walking or cycling. I haven't seen (though perhaps it does exist) a systematic review of how successful this policy has been. As another example, in the US, different cities and states have policies to promote street connectivity, but it is not clear which have been the most effective.

Gareth: You mentioned Japan just now as a country that provides good examples of connected streets. I have visited Japan a few times to review its urban planning and design, at a high level (I am certainly not an expert on how they do things). It seems that the street density and the way that society achieves a peaceful and connected urban society in cities and towns in Japan holds learnings for us all, noting that our local context is always key. Some people I have talked with in Japan have mentioned the language differences, but this isn't the only factor is it.

Adam: *Absolutely. Much of the urban planning literature and guidelines in Japan is of course in Japanese – not much of it is translated into English or other western languages. This makes it harder for people in the UK and US to be familiar with how things work in detail. At a high level we can see how things work – their public transport being an easy example for us to see – but there are not many people in the US with a deep understanding of the policies and professional norms and practices.*

Chris and I wrote a paper with one of my students, Felix Vazquez, a couple of years ago about the street networks in Tokyo. In this review we found that streets in Tokyo and its metropolitan area have always been very well connected, and that this degree of connectivity has persisted over the long-term, even through disasters that the city has endured.

There is a huge benefit in planners liaising with one another for cross-fertilisation, both for technical policy work and for understanding how institutions and political context shape how street networks have arisen and how they are maintained.

Gareth: Linked to road capacity, it is interesting to think about congestion pricing in cities. NYC is an interesting current example to observe, and early data about its effect on traffic is being reviewed. In London congestion pricing has been in place for quite some time, and indeed it has expanded over the years. Likewise in Gothenburg. Yet for some cities this approach hasn't been able to receive approval.

Adam: *The London congestion charging scheme has certainly been resilient. It is an example of how, once these schemes are put in place, they tend to remain in place. Ken Livingstone (the former Mayor of London) championed the London scheme, and his successors have continued with it.*

Gareth: I link my urban work to the 17 UN Sustainable Development Goals (the SDGs) through an urban system I use. Should we be doing more to link our analysis and decision-making on how to improve urban planning to the SDGs?

Adam: *I would say that street networks are the skeleton of cities, so they are enablers of making good sustainable development possible, which incorporates many of the SDGs. Good street design helps foster good environmental behaviours, access to public services and it fosters good social inclusion.*

A connected network of streets should make it easier for people to walk and cycle, thus improving healthy forms of living, and it can support a good public transport system that is socially inclusive and provides people with choices.

Conversely, if you have gated communities, they are the antithesis of this type of approach. If you have to funnel through one or two gates, it is unlikely that people will walk or use active transport, because it takes more time.

Gareth: I can see the links between street networks and the SDGs that relate to good health and wellbeing, quality education, sustainable energy, reducing inequalities, industry innovation and infrastructure, and of course sustainable cities and communities.

Are node points important to consider in street design to help people make efficient choices?

Adam: *I remember a piece of advice by Jarrett Walker, that if you want good public transport services you need to be "on the way" between two important points. For example, living between a big employer and a major railway station means that you are "on the way" of public transport that will be run between these major points.*

Gareth: Thanks for this example, Adam. I'd like to finish with by asking if you can suggest any books about street design and transport thinking that may be worth people looking up?

Adam: *As it happens, I edit the book reviews for an academic journal.*

A book I have just enjoyed reading which is about wildlife ecology and roads is Crossings by Ben Goldfarb.

On sustainable transport in general, Susan Handy's book, Shifting Gears is a good read.

Jarrett Walker's book, Human Transit, is a good book about public transport planning.

On parking, a book that is a US-focused and I think also relevant elsewhere, Paved Paradise by Henry Grabar, is an accessible look at the implications of parking policy.

Gareth: Thank you very much for your thoughts and perspectives, Adam.
I can see many linkages to our discussion and a systems approach that I have developed called Urban 2.0, which is outlined in the diagram below (it links to the SDGs and the 2030 Agenda). I am looking forward to following the progress of your work at the UCLA Luskin School of Public Affairs.

Urban 2.0 system image – by G Byatt