Cities in motion: how we mapped the matatus of Nairobi

A project makes sense of the brightly coloured, seemingly anarchic minibuses that stitch the Kenyan capital together

- Jacqueline M Klopp
- theguardian.com, Wednesday 19 February 2014 07.00 GMT

Nairobi's matatu routes, as researched and compiled by the 'digital matatu' team – a joint venture between Columbia and Nairobi University, Groupshot and MIT

In cities the world over, transit – the profoundly important circulatory system for urban life – is poorly supported, planned and regulated. This is especially true where the transit system has many "informal" aspects. In such cases – and there are many across Africa, Asia and Latin America – even basic information is unavailable. Navigating and understanding these public transport systems as a passenger, a planner or advocate is often bewildering.

A case in point is Nairobi. The vast majority of people in the Kenyan capital – around 3.5 million – rely mainly on "matatus" to get around. Matatus are public service vehicles of varied size, usually painted in bright colours and humourous slogans, operated by many private and poorly regulated businesses. In the 1990s, the Kenyan government allowed the formal bus system to collapse; since then, it has largely failed to plan for its public transit system – all the while collecting fees from licences and fines from matatus.

Matatu operators and owners – in interaction with their passengers – are Nairobi's invisible public transit planners. Nairobians have a complex relationship with this homegrown system: it elicits admiration – whole websites are devoted to matatu art and culture – but also anger, with frequent editorials in the papers about the "matatu menace". Nearly everyone agrees that it needs to be better regulated and planned. The question is how.

The government, meanwhile, is planning many largescale urban transport projects – but how they will impact on the matatu system, and mesh with it, is unclear. It is not uncommon for such projects to cater to private cars and completely ignore the city's existing public transit system, which patently needs to become more visible in the city's planning process and public dialogue. But how, when even the most basic information about the matatu system is missing?

A typically colourful matatu named Mist on the streets of Nairobi – many take names from rappers, footballers, songs, films or even sayings. Photograph: Ben Curtis/AP

In 2011, I started chatting about this problem in Nairobi with Adam White from Groupshot, a small, Boston-based design firm specialising in informality. Adam spends a lot of time in the vibrant tech world of Nairobi and, like me, was fascinated with matatus. He noticed that his Kenyan colleagues were striving to create maps, gathering the basic data to make a trip planner and other tools to help navigate the matatu system. We realised that with the low-cost technology of mobile phones, ubiquitous in Nairobi, it is possible to gather basic transit data such as routes and stops.

With Peter Waiganjo and Dan Orwa of the University of Nairobi's C4D lab at the school of computing and informatics, and Sarah Williams of MIT's civic data design lab, plus support from the Rockefeller Foundation, our newly established "digital matatu" team began mapping out the system using mobiles and GPS units. A team of brilliant and dedicated Kenyan students sought out every route they could find in the city – 130 of them, it turned out (no one was sure before). They carefully geo-located stops and collected key information such as whether a stop was sanctioned by the city or not.

Gangs run some routes and theft is a common problem, so we lost a few phones, but thankfully no one was hurt. Some stops are regular but others are not. Routes can get diverted – in response to passenger needs, congestion, construction or the presence of the traffic police. Over time, the digital matatu team created the first comprehensive database of the matatu system – in a standard format (general transit feed specification, or GTFS) that allows easy mapping of data on to Open Street Map or Google Maps, and access to open-source software like Open Trip Planner.

A growing global community of creative urban thinkers and "civic hackers" are helping cities to create and/or open up their transit data. This enables innovation that produces useful apps for passengers and tools for planners, and allows for more public participation including in data creation through

crowdsourcing. As we [swapped experiences with similar projects](#) focusing on Manila, Mexico City and Dhaka, we began to see ourselves as part of a bigger project, ensuring that cities which rely on informal transport systems are part of the technological revolution that is brewing around information and transit.

 A map of matatu stations in Nairobi generated by the digital matatu team

Throughout, we strategised on how to involve potential users of our data. We held workshops with a government thinktank and held a hackathon at the C4D lab to encourage more data users. Young software developers came up with creative ideas, from an app that warns you of unsafe areas (blackspots are notorious in [Kenya](#), with its high traffic accident rates) to a "rave app" that allows you to find other people at night and alert a matatu to pick you up at a specific location.

A database is exciting for software developers but for the public, it is a map that draws attention. Sarah Williams and Wenfei Xu at MIT converted the data into an elegant map that allows you to see all the routes and main stops – the system as a whole, with its starfish tentacles and crowded core.

At the map's launch in Nairobi on 28 January, some exclaimed with pride that it looked like a London or New York map. Others were already asking government officials how they planned to improve transit. The city county of Nairobi officially adopted the map. The press covered it extensively, along with discussions on public transit policy.

To us the data and map are not ends in themselves; they should be powerful ways to spur advocacy and support better-informed public dialogue and planning. This is a necessary step towards better public transit, which is critical to building better cities.

Jacqueline M Klopp is an associate research scholar at the [centre for sustainable urban development](#) at Columbia University, New York, and a member of the digital matatu team