# digitalmatatus

**Towards an Open and Collaborative Digital Platform to improve African Urban Public Transport**

Adam White, Dan Orwa, Jacqueline Klopp, Peter Waiganjo  Sarah Williams
*Paris, Nov. 9th 2017*

# Agenda

- Quick overview of why semi-formal mapping/data collection matters

- Mapping Nairobi paratransit - Digital Matatus

- Applications/Impacts of data

- Challenges

- Opportunities moving forward

# Semi-formal bus systems-mass transit for most of Africa and elsewhere


Matatu -Nairobi


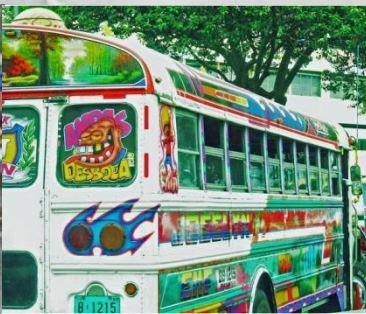Jeepney - Manila


Dhaka


Taxi - West Africa


Colectivo – Mexico City


Manical – Panama City


Lima


Marshrutkas - Russia


Tap, Tap  - Haiti


Daladala – Dar Salaam


Dolmuş in Bodrum, Turkey

# Urban Sustainable Development Goal



GOAL 11

MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

SUSTAINABLE DEVELOPMENT GOALS
More at sustainabledevelopment.un.org/sdgsproposal

# SDG Subtarget 11.2

- By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.
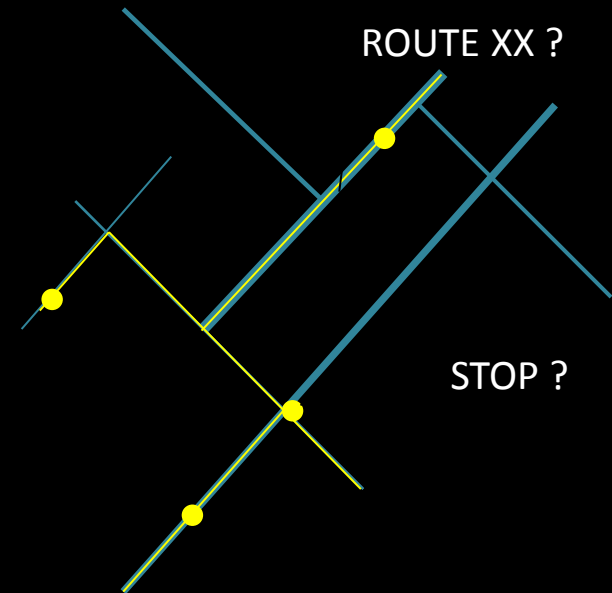
# Improve Public Transport for Equity, Health, Sustainability



**3.5 MILLION PEOPLE**
DEPEND ON NAIROBI'S 130 MATATU ROUTES
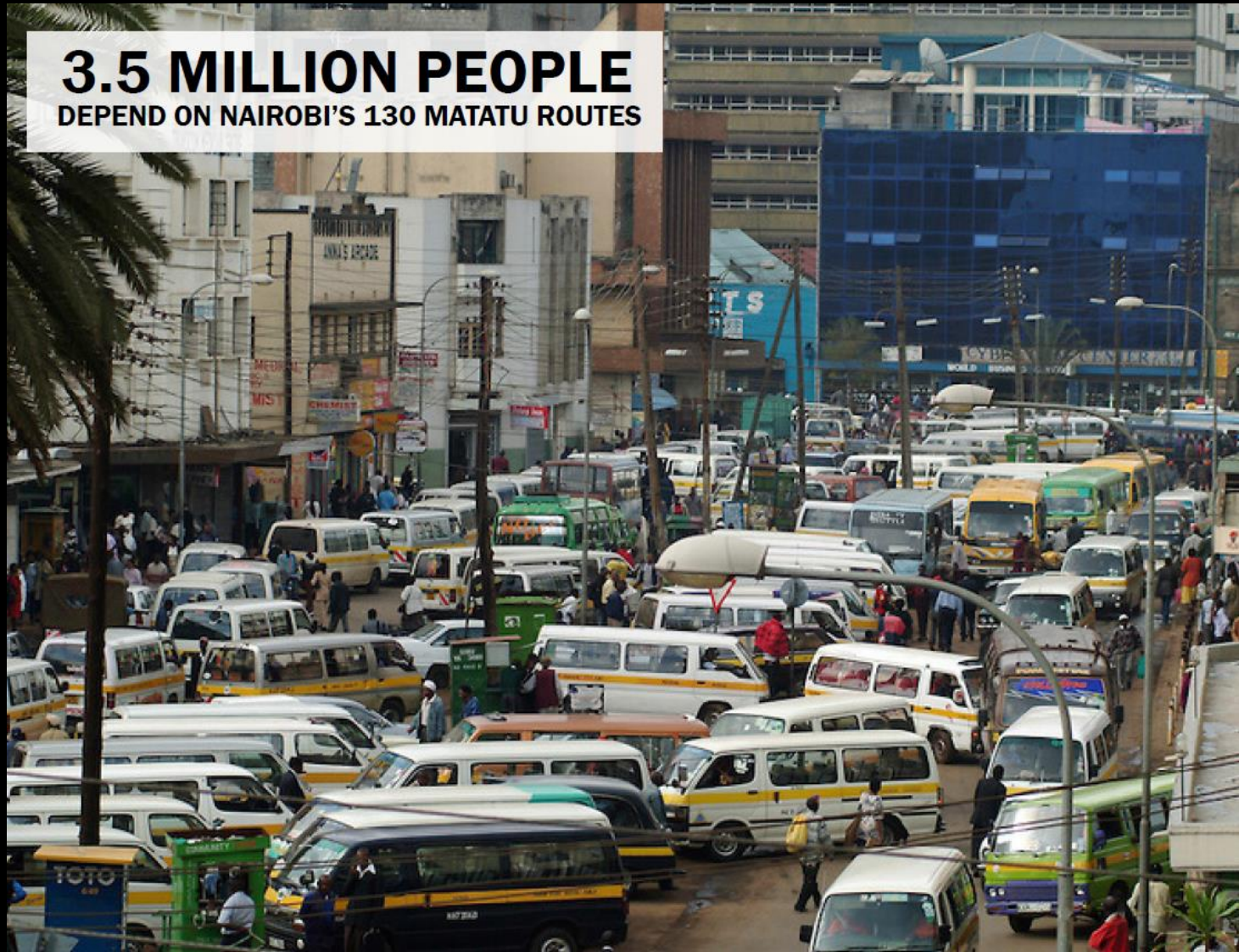
# Semi-formal Bus Systems Lack Data!

- Few or no Maps/Passenger Information/Apps/Data

- Few planning tools

- No modelling and understanding of dynamics for better interventions

- Monitoring USDG 11?

ROUTE XX ?

STOP ?

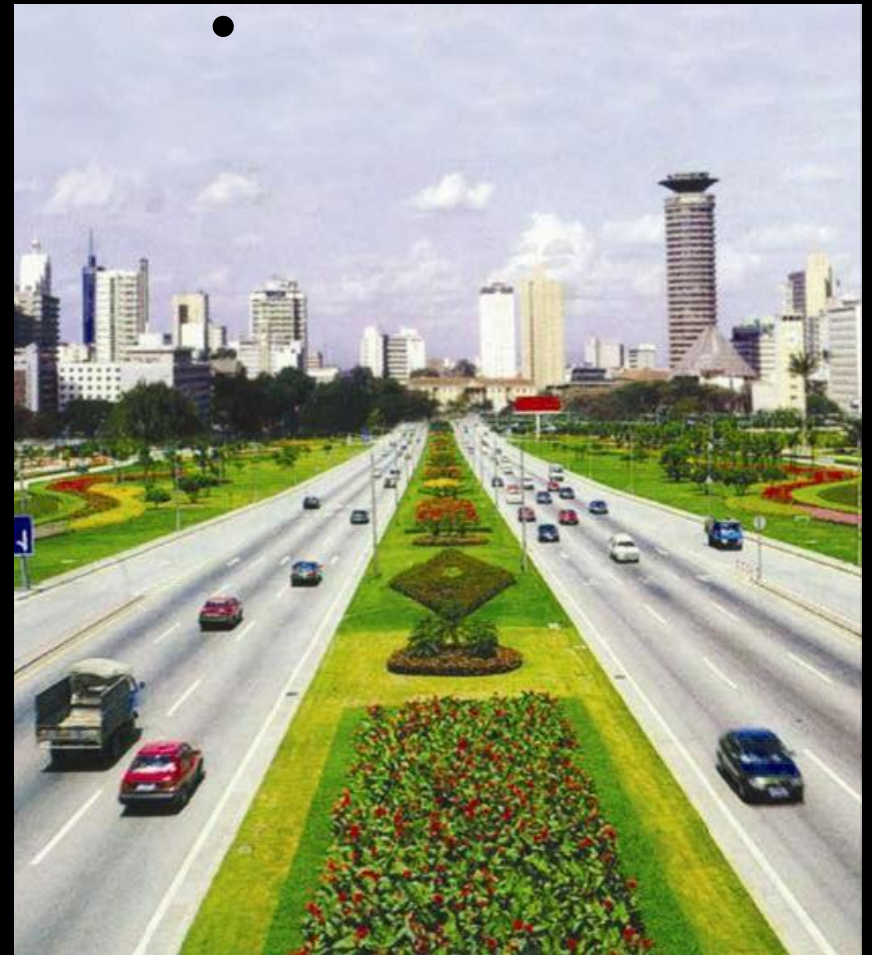These minibus systems are often invisible in planning for African cities

Thika Highway

# Policy Invisibility has implications

Many transportation projects in Africa ignore existing public transport

Making them more likely to be private car oriented- hence less green and more exclusive, less likely to achieve USDG 11



Metro Nairobi Vision 2030

# How to get data?



NATURE OF CELL PHONE USE IN NAIROBI, KENYA TO CAPTURE DATA ABOUT THE INFORMAL TRANSIT SYSTEM, WHICH MOST CITIZENS DEPEND UPON, AND OPEN THAT DATA UP FOR ANYONE TO USE AND BUILD UPON.
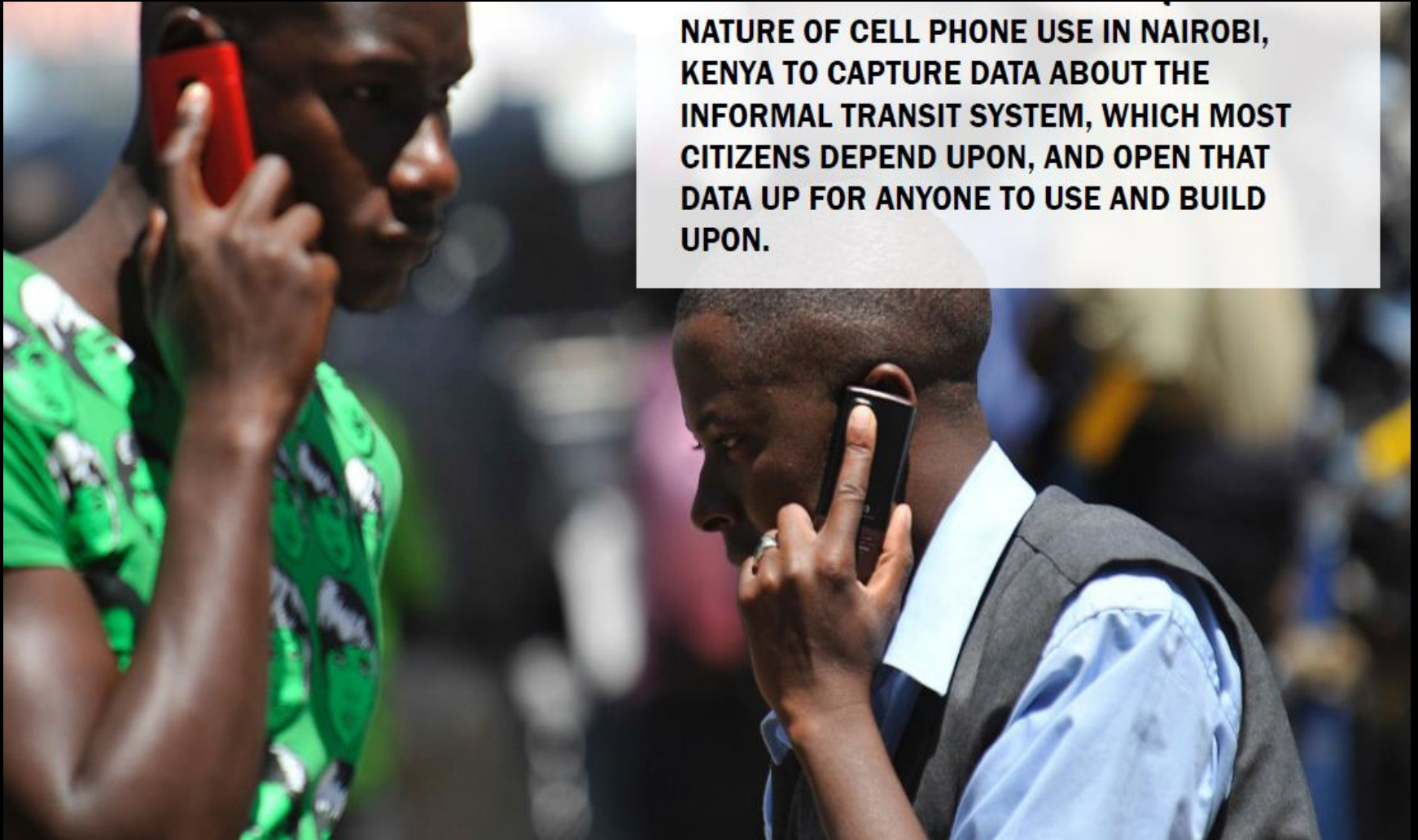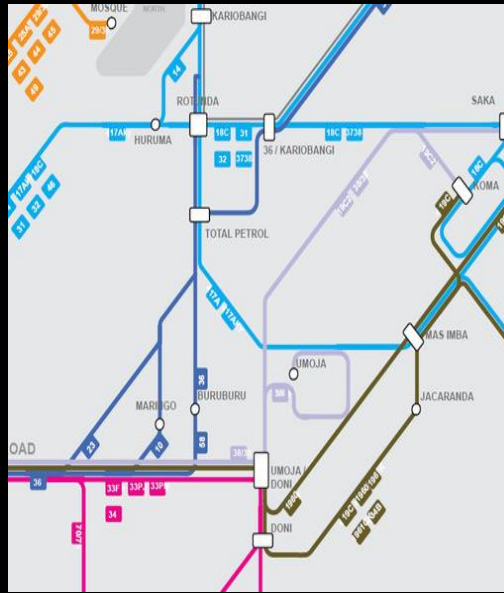
# Leverage Growing Cellphone Use to Collect Missing Transit Data

DIY DATA COLLECTION

+ DEVELOP OPEN DATA

= CHANGE





USER/PLANNING APPS AND INFO

TRANSPORT MODELS

PUBLIC TRANSIT VISIBLE

IN (GTFS) STANDARD FORMAT

+ ONLINE AND PAPER INFORMATION FOR ADVOCACY

= INNOVATION, EMPOWERED USERS AND PLANNERS

# Digitization

## The Local Government Act

### (Cap. 265 )

IT IS NOTIFIED for general information that the City Council of Nairobi has amended its omnibus By-law to provide for the following routes and designated parking for omnibus-

| TERMINUS | ROUTE | DESTINATION | ROUTE DESCRIPTION |
|---|---|---|---|
| Circular | CBD Shuttle A | Circular within CBD | Muthurwa- Globe Cinema Roundabout (via Haile Selassie Avenue-Moi Avenue-Muranga Road)<br><br>Community (via Tom Mboya Street - Cabral Street - Moi Avenue - Kenyatta Avenue-Ngong Road) and back to Muthurwa (via Ngong Road - Haile Selassie Avenue) |
| Circular | CBD Shuttle B | Circular within CBD | Muthurwa – Community (via Haile Selassie Avenue and Ngong road)<br><br>Globe Cinema Roundabout (via Ngong Road – Kenyatta Avenue – Moi Avenue-Muranga Road) and back to Muthurwa (via Tom Mboya Street - Moi Avenue - Haile Selassie Avenue |
| Muthurwa | 19"C" | Komarock | Komarock Estate - Kangundo Road - Outer Ring Road - Jogoo Road Muthurwa |
| Muthurwa | 19/60 | Kayole | Kayole Estate- Kangundo Road - Outer Ring Road- Jogoo Road Muthurwa |
| Muthurwa | 19/61 | Kayole | Kayole Estate- Kangundo Road- Outer Ring Road- Jogoo Road Muthurwa |

# GTFS Data Standard

# Sample Data

## WESTLANDS – KIKUYU SECTION ROUTE # 105

| Label | Description | Latitude | Longitude | Type of Stop |
|---|---|---|---|---|
| 1 | Westlands | -1.2628 | 36.80031 | D |
| 2 | St. Marks | -1.26132 | 36.79749 | D |
| 3 | Lions Place | -1.26109 | 36.79608 | U |
| 4 | Brookside | -1.26075 | 36.79245 | U |
| 5 | AACC/Safaricom/Church Road | -1.25982 | 36.78687 | D |
| 6 | Aga Khan High School | -1.25934 | 36.78281 | D |
| 7 | ABC Place Stage | -1.25897 | 36.7786 | D |
| 8 | ABC Place Entrance | -1.25919 | 36.77746 | U |
| 9 | James Gichuru Junction | -1.25946 | 36.77551 | U |
| 10 | KARI | -1.25974 | 36.77392 | D |
| 11 | Nairobi School | -1.26035 | 36.77108 | D |
| 12 | Deloitte | -1.26309 | 36.76439 | U |
| 13 | AFRALTI | -1.26366 | 36.7613 | D |
| 14 | Kianda School | -1.26395 | 36.75863 | U |
| 15 | Sodom | -1.26425 | 36.75426 | D |
| 16 | Kangemi Market | -1.26429 | 36.74858 | U |
| 17 | Sugarboard/Shell | -1.26454 | 36.74197 | U |
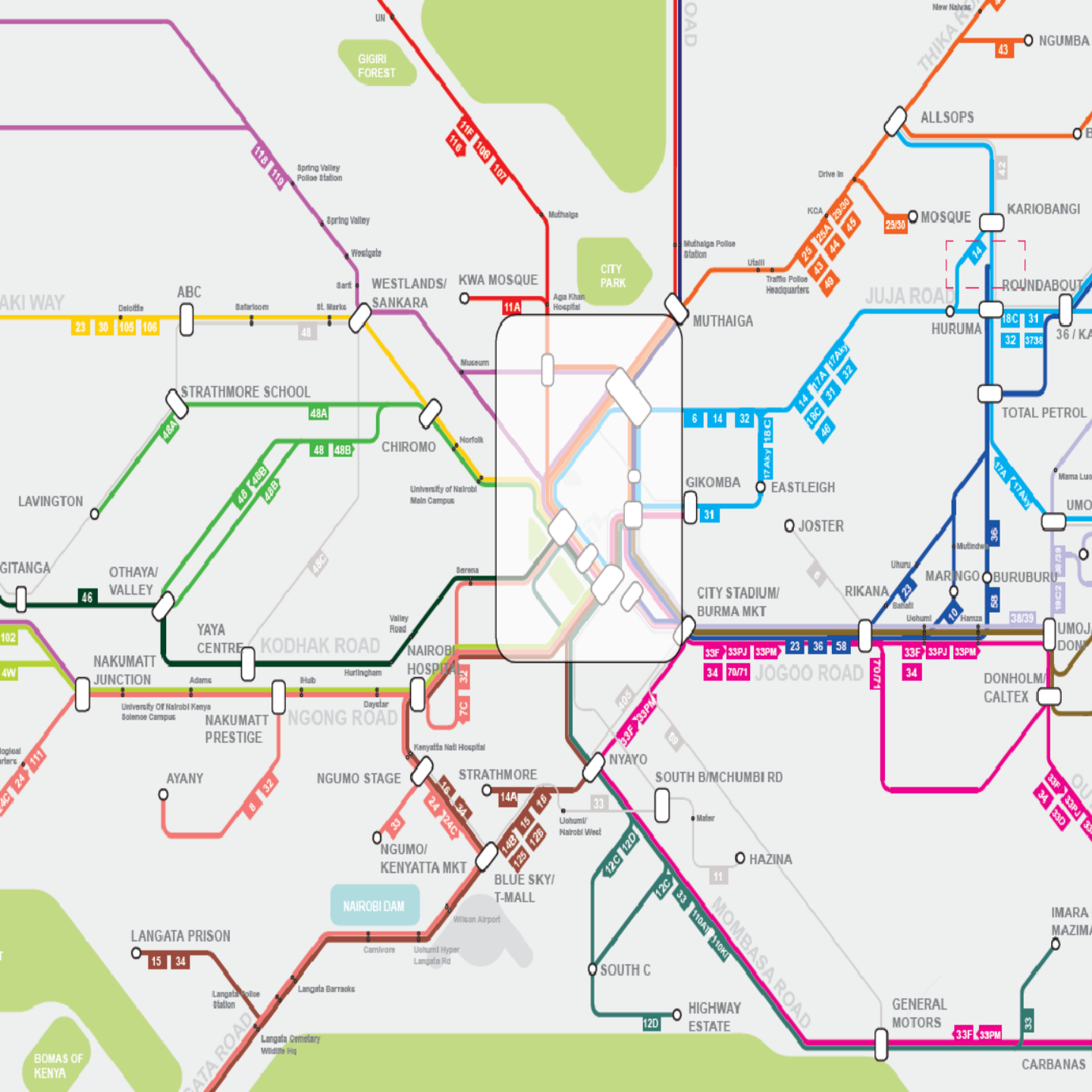
# digital matatus

Collected 136 bus routes, most stops and 6 rail routes for Nairobi

First open GTFS data sets for mini-bus systems in an African city

o

# A Community of Operators, Transit Users, Policy analysts, Technologists, Media



KIPPRA THINK TANK



GROUND TRUTHING DATA

MATATU DRIVERS AND OWNERS

# What impact on public transport, policy and people?

# digital matatus OPEN DATA has made possible information services for citizens



**FIRST** INFORMAL BUS SYSTEM GOOGLE MAPS

**GTFS** STANDARDIZED TRANSIT FORMAT

APP DEVELOPMENT (MA3ROUTE FLASHCAST, MATATU MAP, TRANSIT APP)

BETTER SHARING OF TRANSPORT DATA AND MODELLING

PUBLIC POLICY DISCUSSION ON AN OPEN TRANSPORT DATA FOR NAIROBI

# Free public transit map

# Policy makers and citizen engagement



Provoking a wider
Conversation -
Media
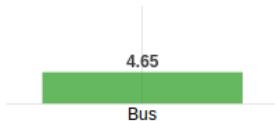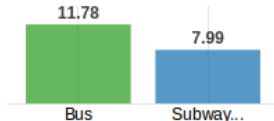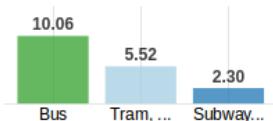
Institutional change -
engagement with policy
makers

# New Planning Tools
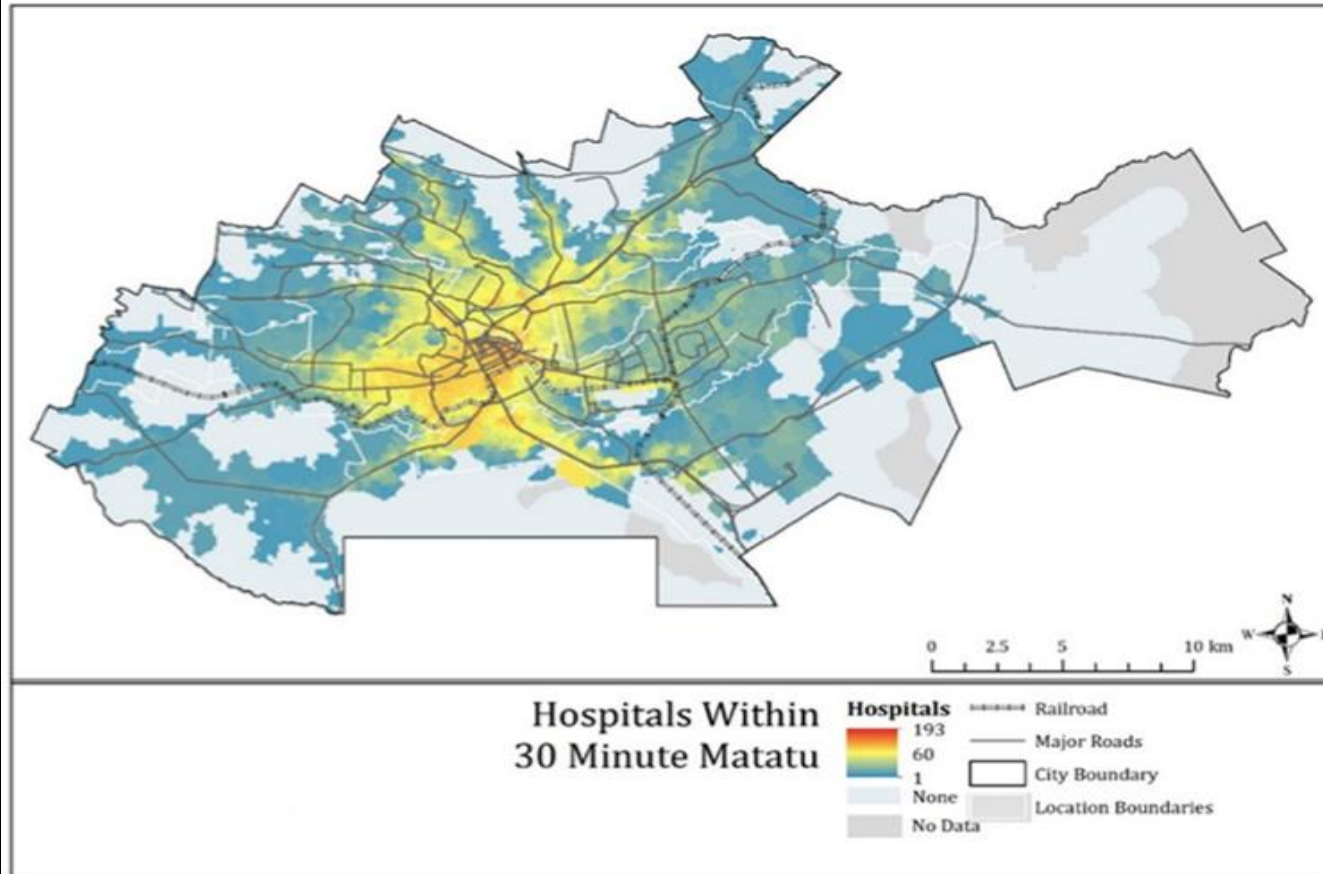
# Support indicators for monitoring

# Crowdsourcing Crash data with Ma3Route



Inspiring other transit related data.  Nairobiaccidentmap.co.ke

# Access to Hospitals (World Bank 2016)



Figure 4.21: Hospitals within a 30-minute matatu ride

Hospitals Within 30 Minute Matatu

Hospitals
193
60
1
None
No Data

Railroad
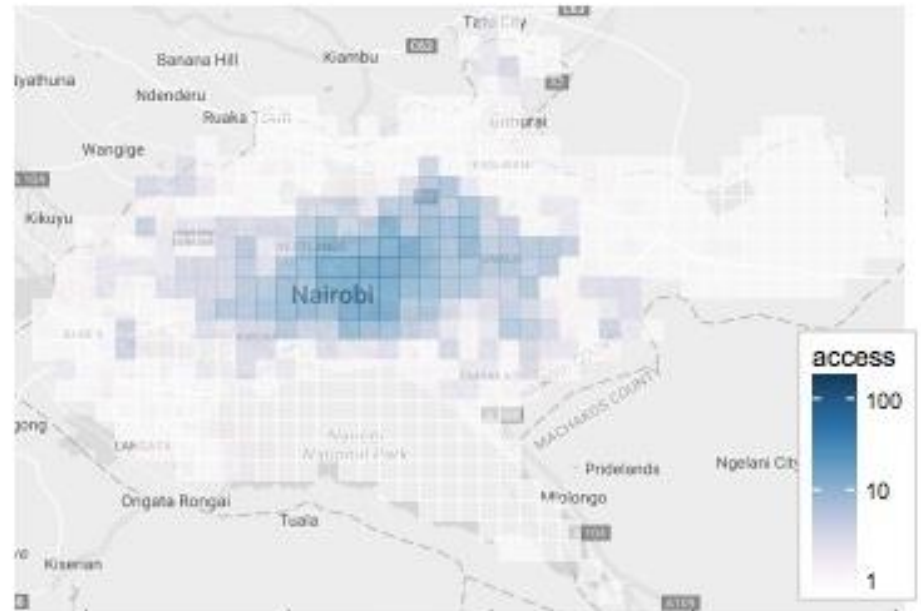Major Roads
City Boundary
Location Boundaries

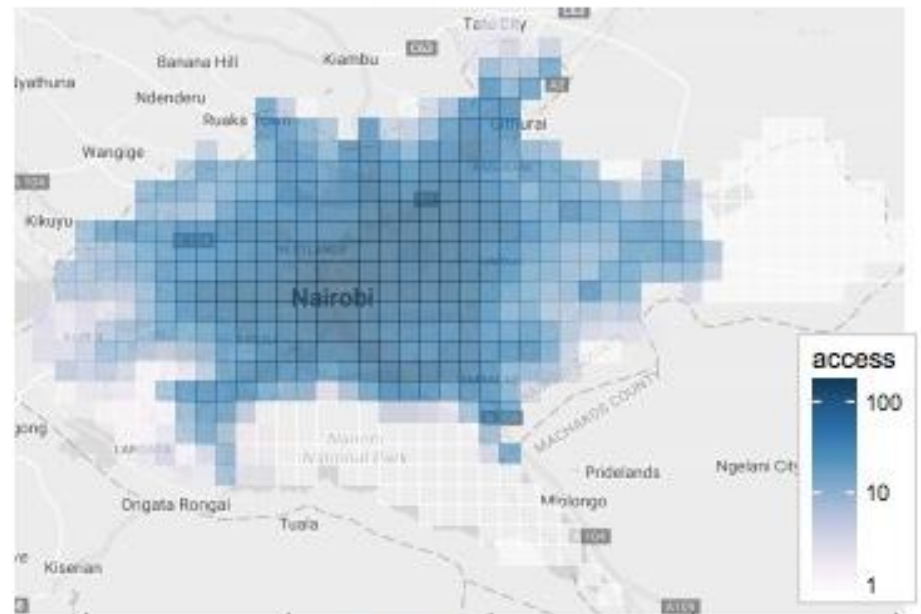Source: Google Maps; Conveyal; OpenStreetMap.

Also Avner and Lall  Matchmaking  in Nairobi" World Bank 2016

# Comparing Access


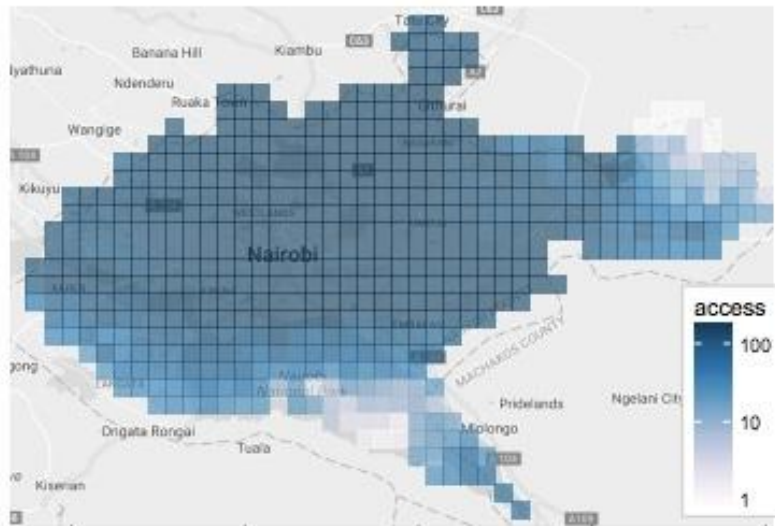
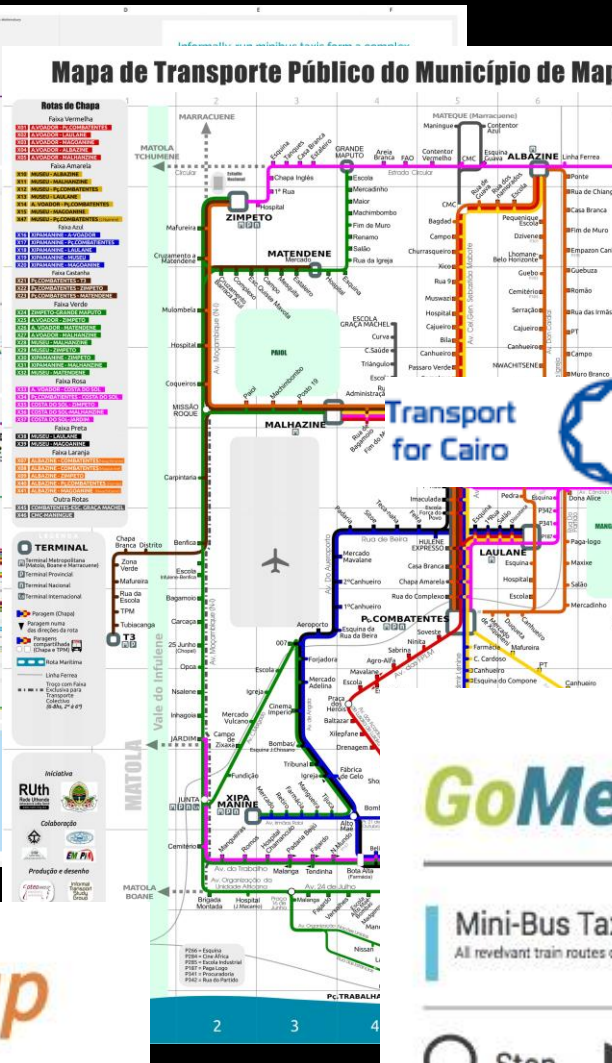Figure 3: Access to Health

(a) Walking

(b) Paratransit

(c) Driving

Campbell, Rising, Klopp and Mwikali 2017

# Mapping is expanding

# Technical Challenges

- Sustainable and routine data collection due to dynamic nature of cities where semi-informal transit occurs: tools, business models?

- Gaps in completeness of the transit data – schedules, fares, safety, capacity, transit indicators, revenues, taxes,…

- Addressing Complex Intermodality

- Analysis with other data layers (network improvements, improving accessibility)

- Transferability to new cities and scaling

# Opportunity: innovating with tools and institutions for updating data
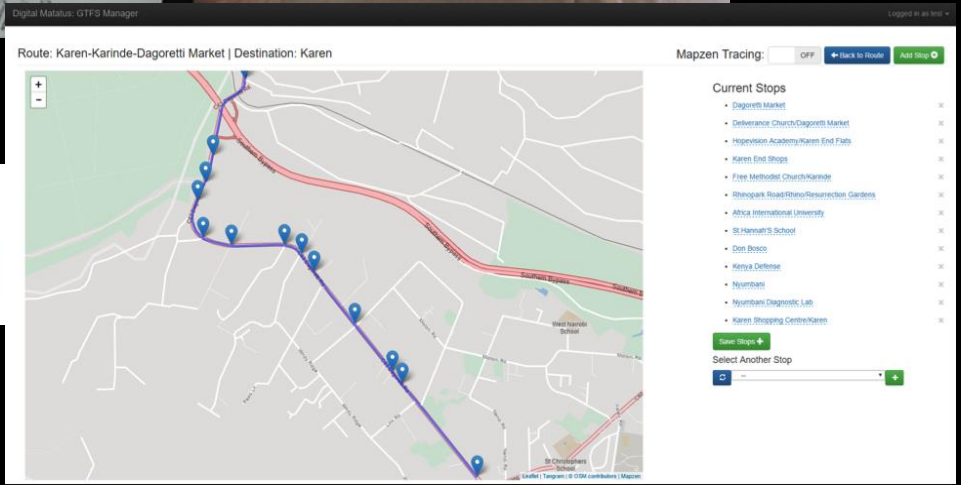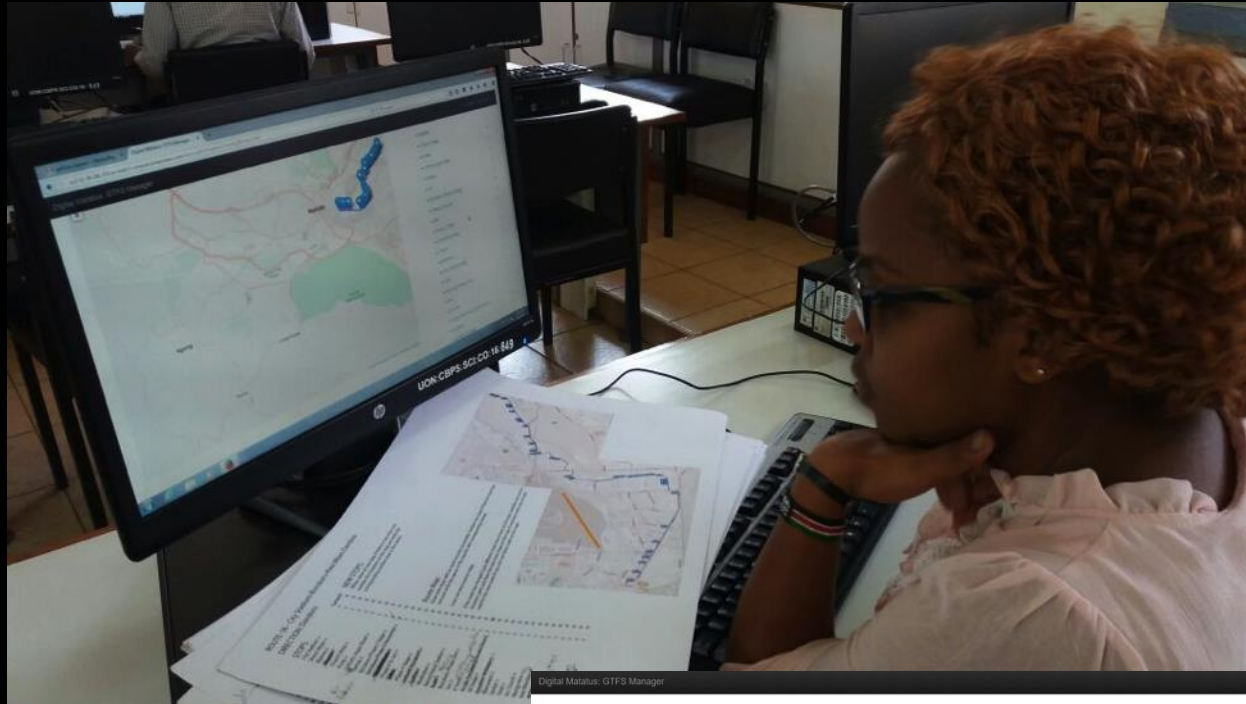
# Opportunity: Exploring Crowdsourcing

- Developed user-friendly, easy to use, low cost updating tools for GTFS data to enhance scalability and sharing across cities
- Investigate sustainable methods for updating the data
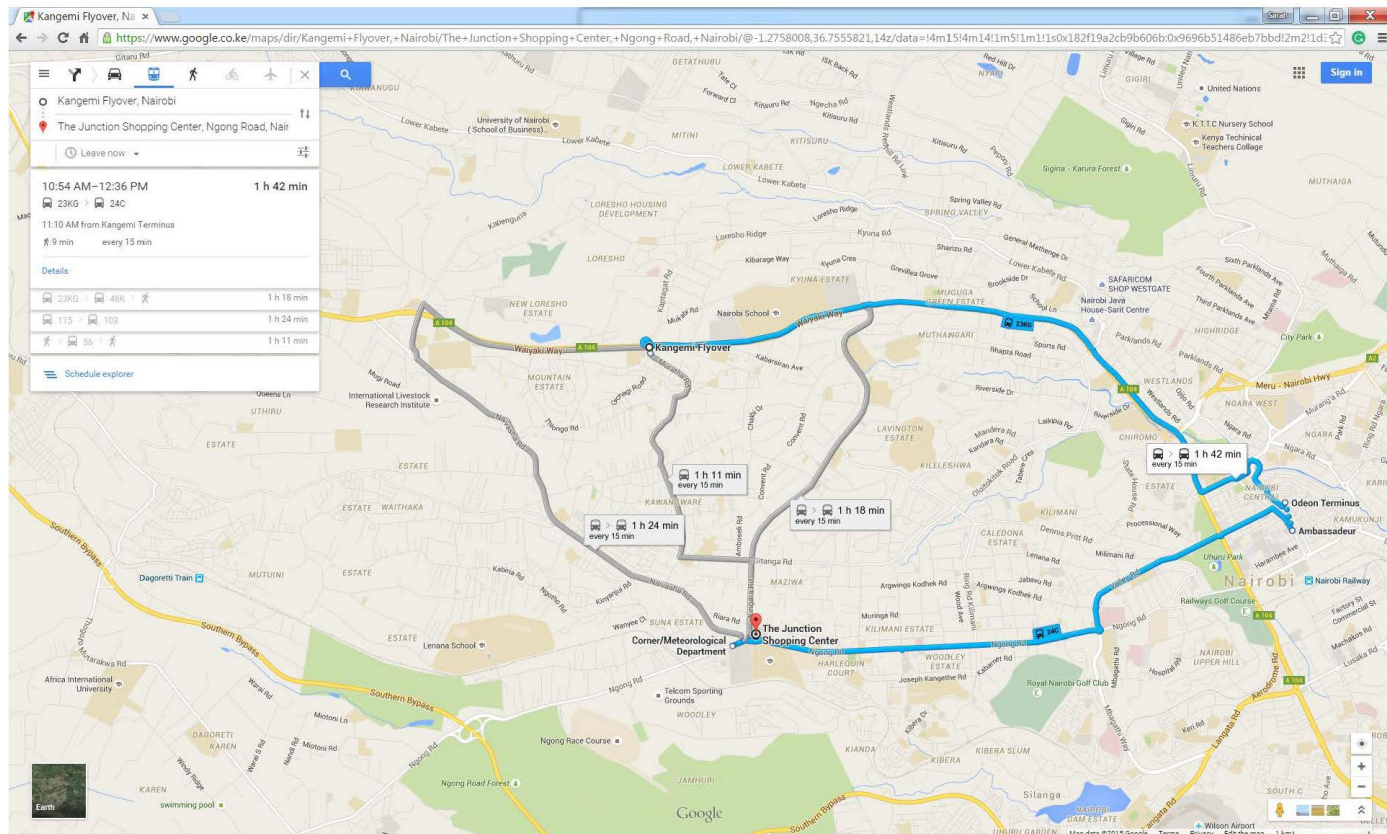  - Crowdsourcing and Flocksourcing



APP to track and manage matatu fare expenditure



Crowdsourcing APP for route updates from commuters, driver,…that use the system frequently

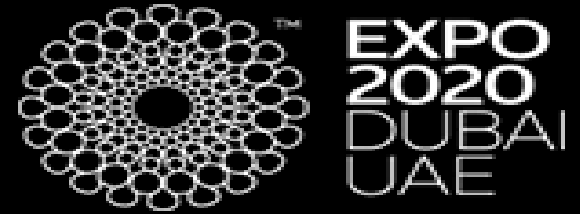# Developing New Partnerships & Business Models



PARTNERSHIP TO CREATE PUBLIC TRANSIT DATA FOR NAIROBI

# Digital Cairo:
## Scale, Inter-modality, Complexity

# Policy Challenges

- Open data; sharing of data; data as a regulator requirement? Digital ethics?

- Which forms of passenger information (including non-digital) most effective for different cities, cultures, groups especially the poor?

- Impacts of more information (Shaheen et al 2017)?

- How to create open transport data portals and institutional systems to support data updating, innovation, harmonization and accountability?

- Mainstream collaborative mapping into transport infrastructure  planning and finance across the globe

# Resource Center
# For Mapping Public Transport with Informality

**Provide tools and services to develop data on public transport systems (specializing in semi-formal systems) and perform this work so it has the greatest benefits for local communities**

| DATA COLLECTION TOOLS | GTFS PRODUCTION TOOLS | VISUALIZATION / POLICY OUTREACH STRATEGIES | STRATEGIC PARTNERSHIPS/ POLICY INIATIVES |
|---|---|---|---|

**This means that data collection will be done collaboratively with local actors including the transport and technology community, the data collected will be open, and a wide variety of local actors will be engaged in the work to sustain and institutionalize it within the city or region being mapping.**