



FLOWMINDER.ORG

Utilising mobile data to support
decision-making

June 2020

Flowminder Foundation

Xavier Vollenweider



About us

Our Mission: Enabling decision makers to access the data they need to transform the lives of vulnerable people at scale

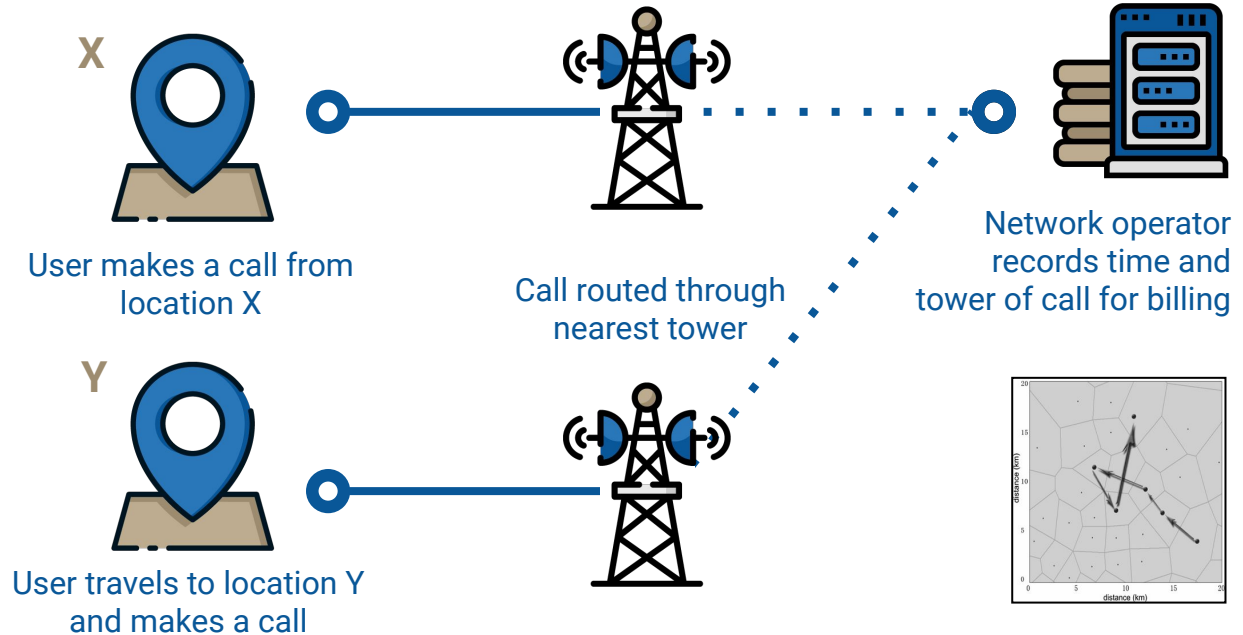
- Non-profit organisation
- Supporting mobile operators and governments to produce and use insights from mobile operator data to improve development and humanitarian decision-making
- Pioneered the analysis of mobile network data to support responses to infectious disease outbreaks and natural disasters
- Funded by Bill & Melinda Gates Foundation, DFID, DIAL, Hewlett Foundation, and many others

A photograph of an older man with glasses, wearing a light-colored checkered shirt, sitting and talking on a mobile phone. He is positioned in front of a blue corrugated metal wall. The entire image has a blue color overlay.

Introduction to Call Detail Records

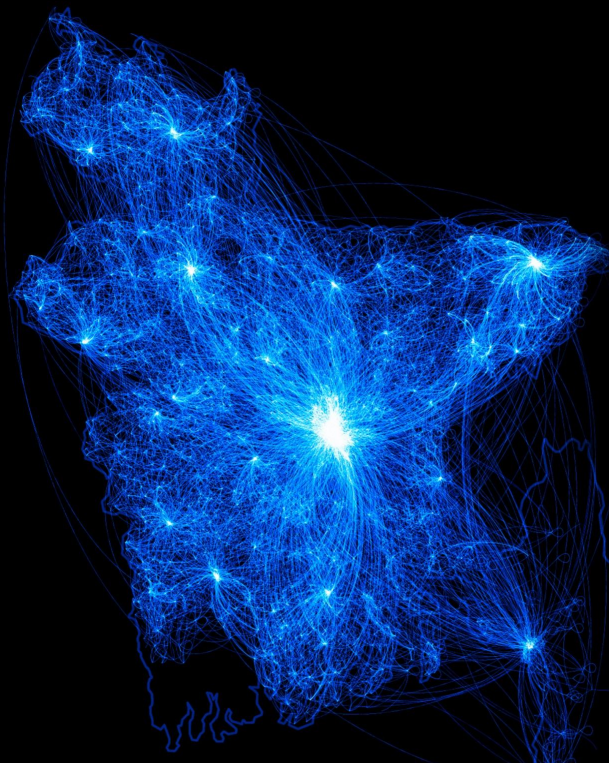
Call Detail Records (CDR)

- Base stations/towers with multiple cells
- Mobile Network Operators maintain a database of call detail records (CDR) for billing purposes



The New York Times

Benefits of using CDRs



- Automatically generated.
- Continuous stream of data – **near real-time**.
- **Mechanically collected** – purely factual, no interview bias.
- **Billions of data points from millions of people** – large geographic and time scales covered.
- Better **population representativeness** than data that can be obtained from smartphones only (e.g. data from location apps)

Utilising **mobility** data in the COVID-19 context



Primary effects of
COVID-19 measures



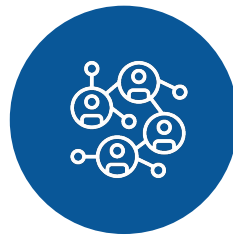
Side effects of
COVID-19 measures



Identifying routine
mobility patterns (to
plan interventions and
assess risk levels)



Changes in population
density (for resource
allocation and incidence
measures)



Input to other models,
e.g. transmission models

Data quality

System or processing issues	Analysis issues
Data missing for some time period	Spatial resolution
Corrupted records	Temporal resolution
Errors in location e.g. location is outside country borders	Representativeness of the data
	<i>Not everyone uses a mobile phone</i>
	<i>We only have data from one MNO</i>
	<i>One SIM doesn't always correspond to one person</i>



Our approach

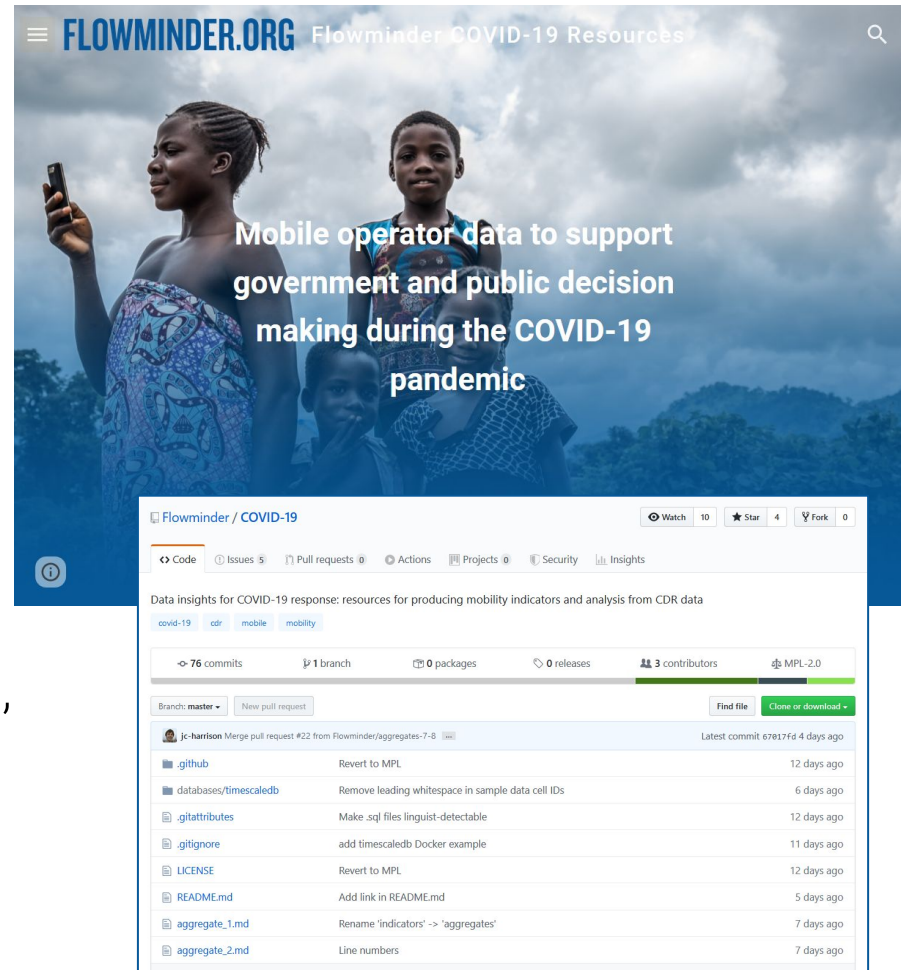
An aerial photograph of a city landscape. In the background, a tall, modern building with a grid-like facade stands out against a hazy sky. The foreground and middle ground are filled with lush green trees and vegetation. A road with a few cars is visible in the lower part of the image. The overall scene is a mix of urban development and nature.

Privacy & data governance

- Flowminder releases aggregated and anonymised statistics
- No individual level data leaves the country
- No individual level data leaves the control of the mobile network operator
- GDPR compliant
- Open code to allow peer review and build trust

Flowminder's strategy to support the COVID-19 response

1. Providing publicly available instructions, code and materials
2. Providing remote support
3. Providing in-depth hands-on analytical, technical and logistical support to a limited number of countries where Flowminder has already long term access.



The image shows a screenshot of the Flowminder website's COVID-19 resources page. The header features the Flowminder logo and the text 'Flowminder COVID-19 Resources'. Below the header is a large banner image of a woman and two children in a rural setting. Overlaid on the banner is the text: 'Mobile operator data to support government and public decision making during the COVID-19 pandemic'. Below the banner is a screenshot of a GitHub repository for 'Flowminder / COVID-19'. The repository page shows the code tab selected, with a commit history table. The commit history table lists several commits with their descriptions and dates.

Flowminder COVID-19 Resources

Mobile operator data to support government and public decision making during the COVID-19 pandemic

Flowminder / COVID-19

Code Issues 5 Pull requests 0 Actions Projects 0 Security Insights

Data insights for COVID-19 response: resources for producing mobility indicators and analysis from CDR data

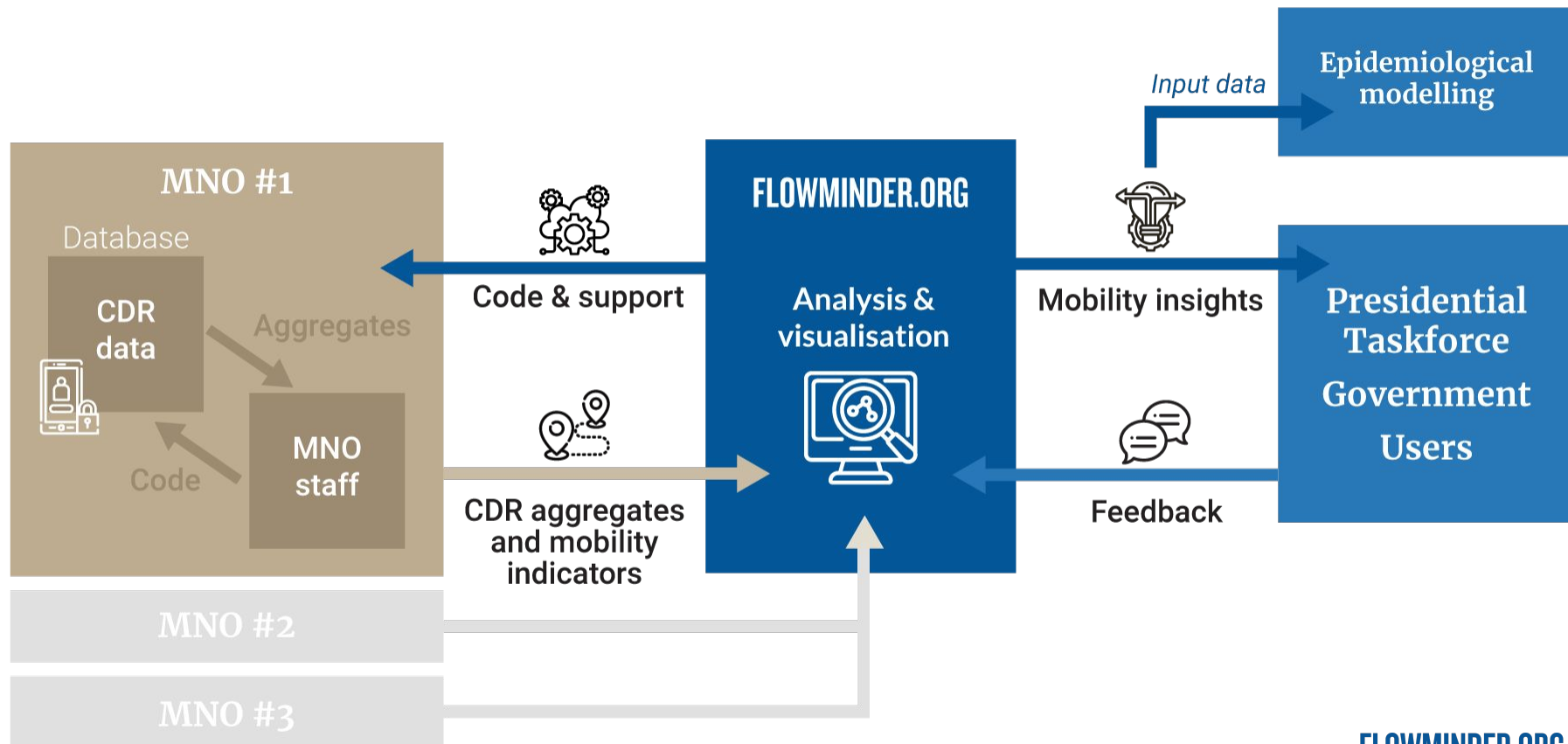
covid-19 cdr mobile mobility

76 commits 1 branch 0 packages 0 releases 3 contributors MPL-2.0

Branch: master New pull request Find file Clone or download

jc-harrison	Merge pull request #22 from Flowminder/aggregates-7-8	Latest commit 67b17fd 4 days ago
.github	Revert to MPL	12 days ago
databases/timescaledb	Remove leading whitespace in sample data cell IDs	6 days ago
.gitattributes	Make .sql files linguist-detectable	12 days ago
.gitignore	add timescaledb Docker example	11 days ago
LICENSE	Revert to MPL	12 days ago
README.md	Add link in README.md	5 days ago
aggregate_1.md	Rename 'indicators' -> 'aggregates'	7 days ago
aggregate_2.md	Line numbers	7 days ago

Mobility work – implementation approach





FlowKit

What is FlowKit?

- Open source free software suite built from familiar technologies such as Python, Postgresql, PostGIS, Airflow.
- Enables secure processing, analysis and granular access control to CDR data for humanitarian and development purposes
- Installed wherever CDR is stored, recommendation is in-country behind MNO's firewall.

<https://flowkit.xyz/>

Pre-installed FlowKit providing rapid data for Ghana Government's COVID-19 response | 4 days from request to report

Mobility analysis to support the Government of Ghana in responding to the COVID-19 outbreak

Initial insights into the effect of mobility restrictions in Ghana using anonymised and aggregated mobile phone data

03 April 2020

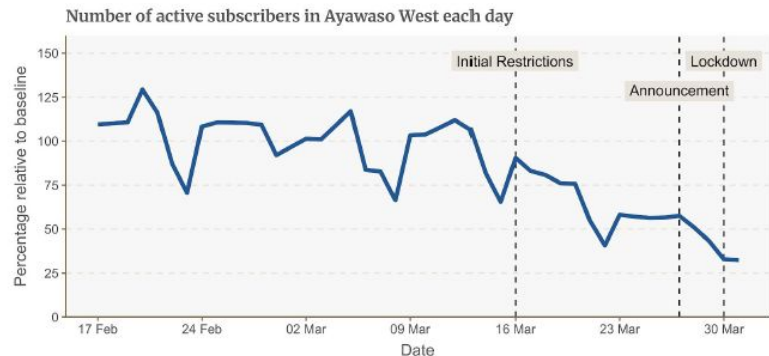
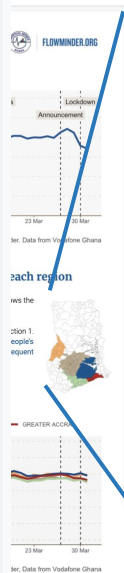


Figure 1: Number of active subscribers in Ayawaso West each day

Analysis by Flowminder, Data from Vodafone Ghana

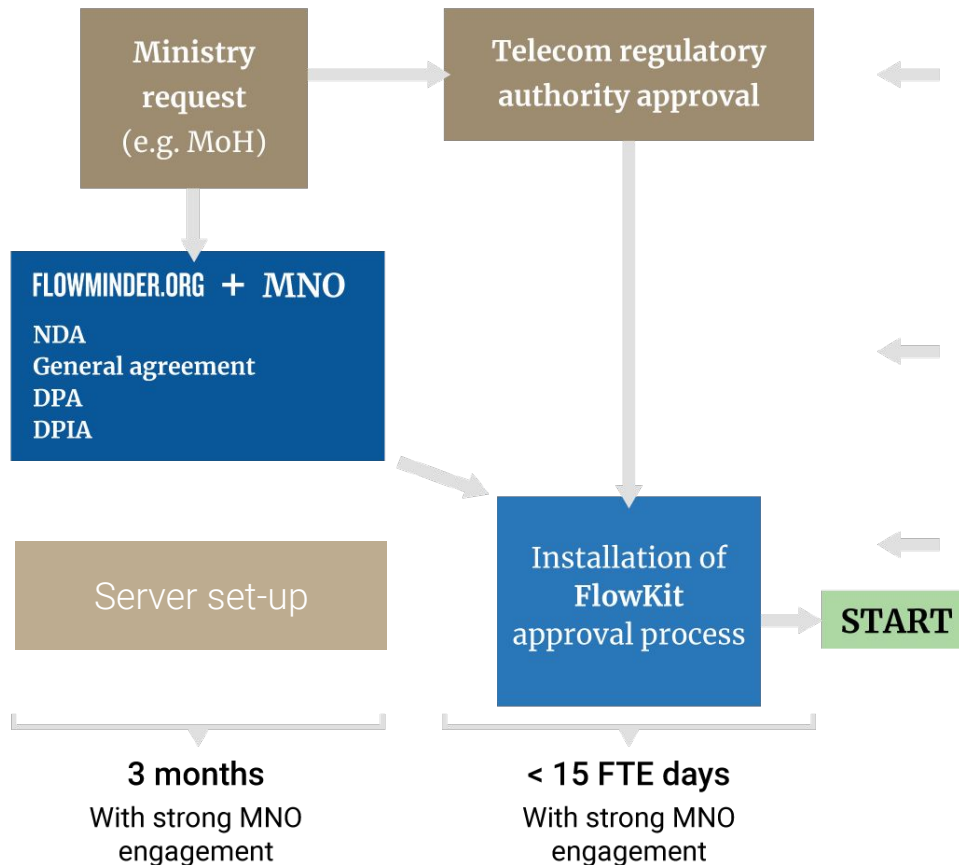


How to set up FlowKit in a country?

Institutional governance in country

FlowKit legal process
(need to abide to GDPR)

FlowKit technical process
(in-country & remote)



Required

Government access
Well recognised brand

Experience in such collaborations
Legal expertise on GDPR + contractual law
Strong MNO engagement

IT System Engineering
Data Science with CDR expertise
Knowledge of FlowKit



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