Emergency Preparedness Working Group Mobipack: Supporting the Use of Telecom Data to Inform the COVID-19 Response Efforts

Purpose: Information
Submitted by: EPWG Co-Chair

Tourism Working Group Virtual Meeting on COVID-19
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Mobipack: SUPPORTING THE USE OF TELECOM DATA TO INFORM THE COVID-19 RESPONSE EFFORTS

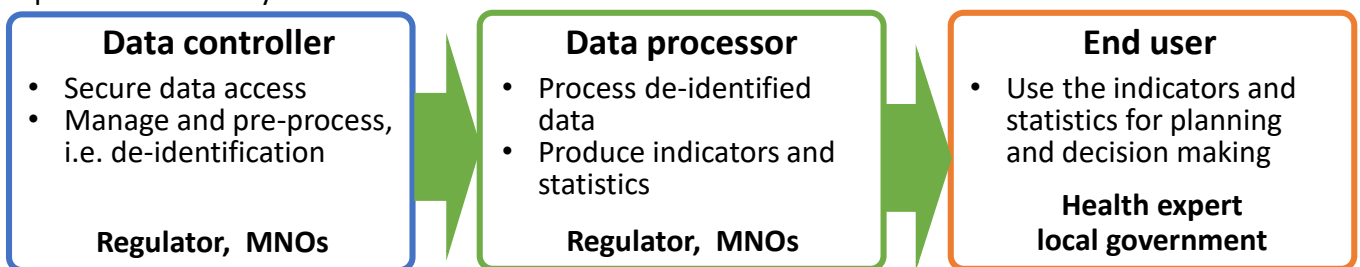## Telecom data can inform the COVID-19 response efforts

Telecom data cover a large part of populations even in less developed countries. The data include the time and associated cell tower location of network events, such as calls and SMS, thus can be used to understand mobility patterns and human behavior.

Telecom data can provide insights on the time-varying distributions and footprints of subscribers at the cell tower level. Because the data are passively collected in near-real-time, it can be used to produce time-varying indicators of mobility patterns. Such indicators can help us answer the following questions that can potentially inform the COVID-19 response efforts:

- **How many people visited hotspots? Where did they come from? Where did they go afterward?**
- **How the restriction impacted population movements? How many people are still away home and for how long?**
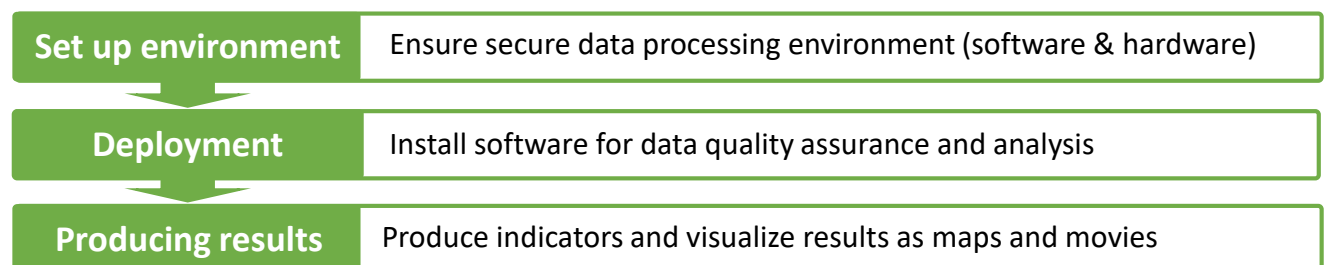
How we can support

We work with various stakeholders to help use telecom data to inform decision making and planning for the public good. We support the regulators and mobile network operators (MNOs) to establish a data pipeline that enables to extract data on mobility patterns and human behavior without compromising existing systems on the premise of the data controller. Entire support can be provided remotely.

Data controller	Data processor	End user
• Secure data access • Manage and pre-process, i.e. de-identification **Regulator, MNOs**	• Process de-identified data • Produce indicators and statistics **Regulator, MNOs**	• Use the indicators and statistics for planning and decision making **Health expert local government**

Technical support we can provide

We provide the following support to establish the data pipeline that produces indicators and visualizations from de-identified telecom data:

- Provide **open-source software – Mobipack*** – that enables mobility analysis and visualization using de-identified telecom data.
- Set up **a Hadoop-based system** to run programs/software such as Mobipack as well as any other software developed by third parties.

Set up environment	Ensure secure data processing environment (software & hardware)
Deployment	Install software for data quality assurance and analysis
Producing results	Produce indicators and visualize results as maps and movies

* Mobipack is open-source software under MIT license. Its development was initiated by The University of Tokyo (UoT), and enhanced by the support of ITU and MIC, Japan in 2015 to demonstrate the possibility of the use of telecom data for the epidemic control. Currently, it is maintained by Spatial Data Commons – a joint effort by UoT and LocationMind Inc.

Data security and processing environment

- Any identifies are encrypted in an irreversible manner. No personally identifiable information is included in the data used for processing and producing indicators.

- Telecom data can be processed on the premise of regulators and/or MNOs. No need to bring data out of the system for an entire process. The data can be managed by regulators and MNOs in a safe and responsible manner.

Use cases

Our ongoing efforts for supporting the COVIS-19 response include the analysis and visualization of the following indicators on a daily basis in African countries:

- Headcounts of subscribers at district level (daytime and night-time)
- Headcounts of subscribers who are away from home during the daytime (before and after the restrictions)
- Inter-district ODs (Origin-Destination) of all subscribers and subscribers visiting districts that patients visited on the same day
- Median travel distance at the district level
- Average radius of gyration at the district level

Following images are the example of outputs of Mobipack. These images were created for the ITU project "Big Data for Development: Preventing the Spread of Epidemics".

Above figure shows the distribution of people who passed/did not pass through a hazard area. By overlaying the hazard area with the mobility estimates from telecom data, the larger-yellow dots inside blue polygons indicate those who passed through, and smaller dots outside the polygons indicate those who did not pass through the hazard area.
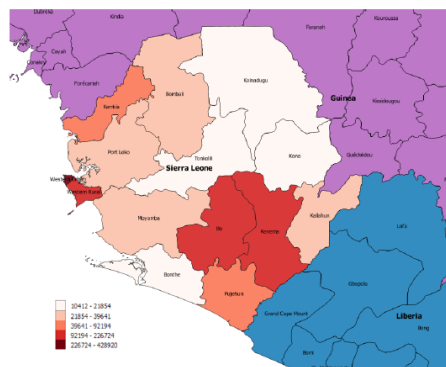
Above figure illustrates the transboundary population of mobile users from Guinea and Liberia who visited Sierra Leone. Population was calculated from the total number of unique mobile users who visited Sierra Leone.

Source: ITU. Call Detail Record (CDR) ANALYSIS: SIERRA LEONE, 2015.
https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Pages/BigData/default.aspx)

About us

We are a group of researchers and engineers from The University of Tokyo and LocationMind Inc. with expertise in big data analysis, AI, geospatial analysis, GNSS technology, and social surveys and analysis.

We provide Mobipack, and associated systems/tools (e.g. Mobmap) for visualizing and analyzing telecom data by drawing on our experiences in data analysis and capacity building –work with regulators, MNOs, MIC Japan, and international organizations such as ITU, ADB, and the World Bank.

Website: https://sdc.csis.u-tokyo.ac.jp/
Github: https://github.com/SpatialDataCommons/CDR-analysis-tools-std
Mobmap: https://shiba.iis.u-tokyo.ac.jp/member/ueyama/mm/

Spatial Data Commons, The University of Tokyo

Empowering Global Community with New Data Sources and Open Technologies