BigData UN Global Working Group

PULSE LAB JAKARTA

SHAPING DEVELOPMENT FOR THE DIGITAL AGE

Jakarta, 13 June 2019

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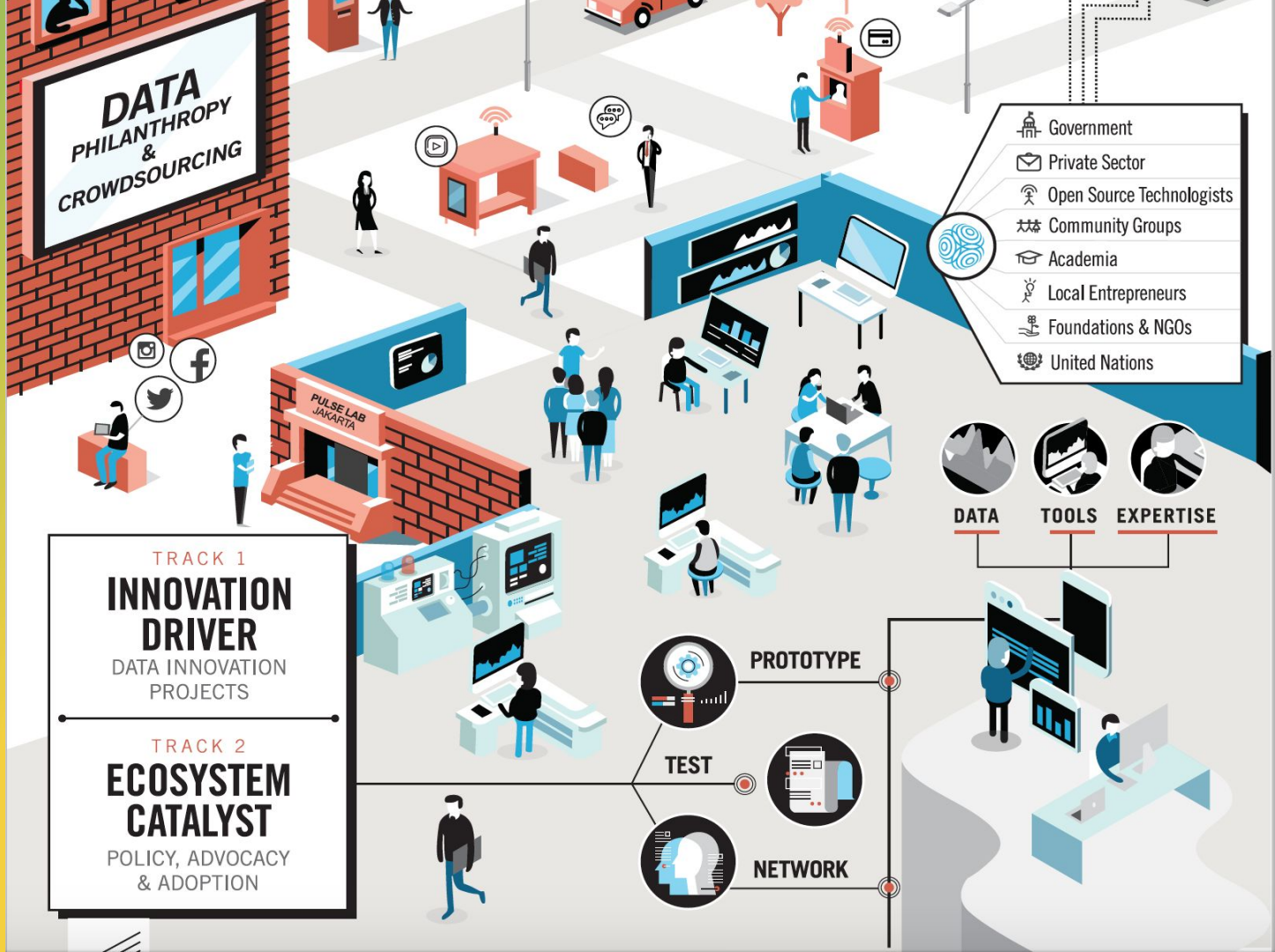
UN Global Pulse

Global Pulse is an innovation initiative of the United Nations Secretary-General on big data and AI. Our vision is a future in which big data is harnessed safely and responsibly as a public good. Our mission is to accelerate discovery, development and scaled adoption of big data innovation for sustainable development and humanitarian action.



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SERVICES

Through its network of labs, UN Global Pulse provides three main services which include:

driving **exploratory research** on new insights that can be gleaned from unconventional data sources

helping UN agencies, governments and development partners make **better use of their data**

advocating for the **ethical use of data** and technological platforms in line with the protection of individual privacy

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A Snapshot of Our Projects

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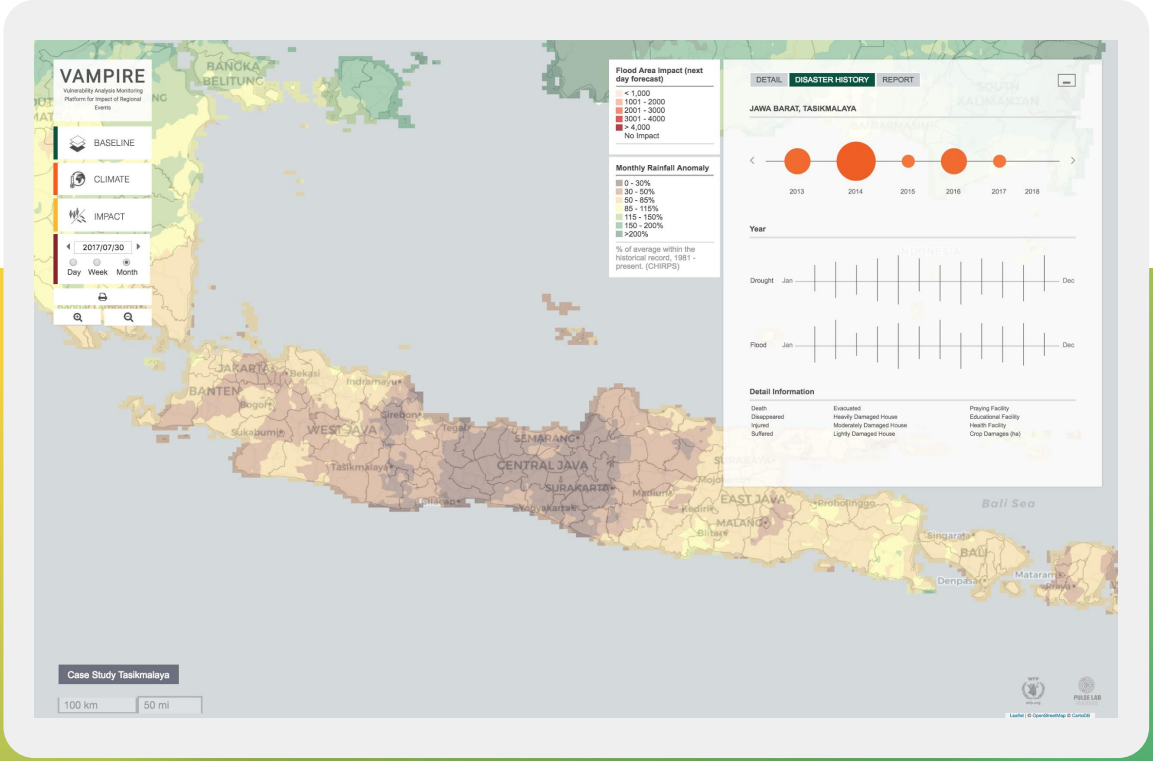
Indonesia and Sri Lanka - Multiple Data Sources



VAMPIRE

- Vulnerability Analysis
- Drought Impact
- Early Warning System
- Executive Office of the President of Indonesia.

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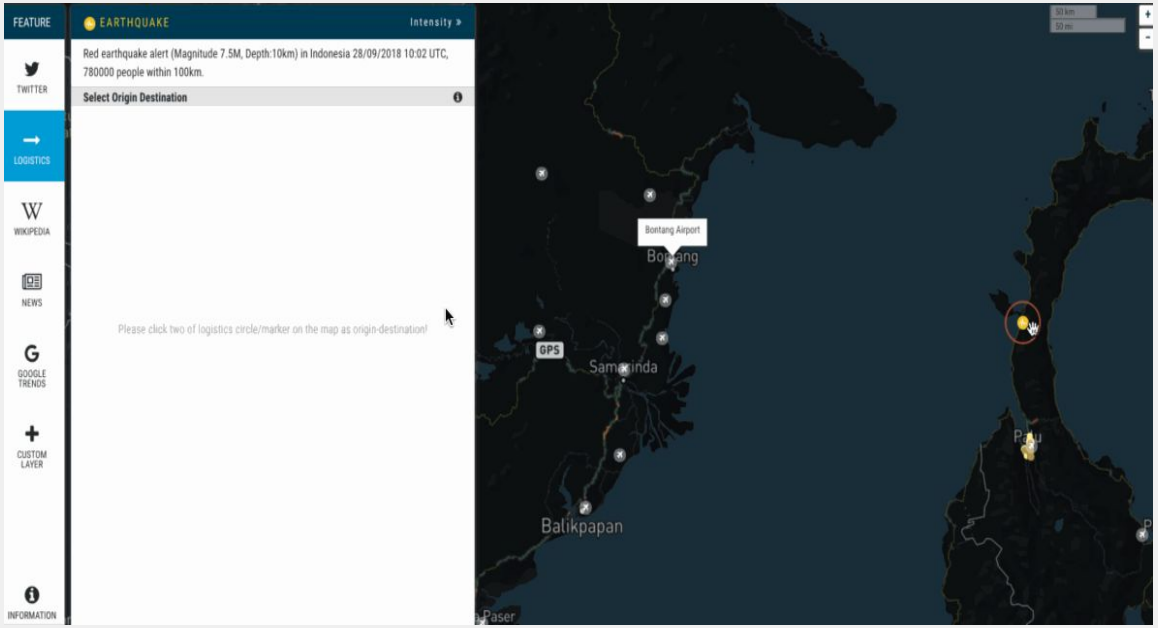
Indonesia and The Pacific Region - Multiple Data Sources



11 SUSTAINABLE CITIES AND COMMUNITIES
13 CLIMATE ACTION
17 PARTNERSHIPS FOR THE GOALS

MIND

- Managing information for natural disasters
- Open Source
- Logistics Planning
- Disaster Response

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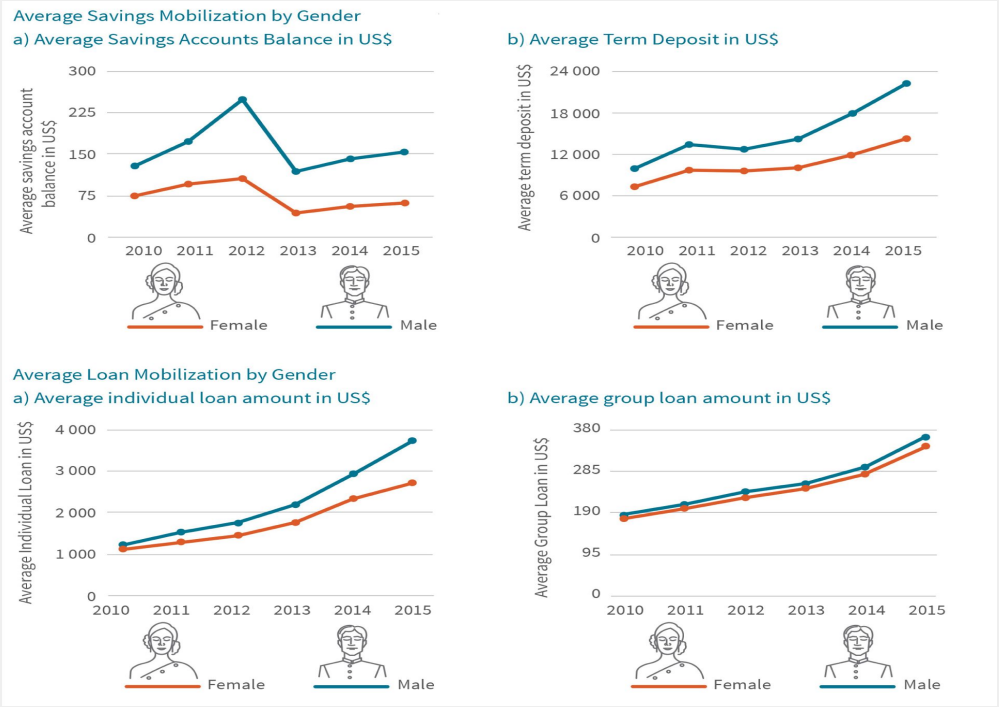
Cambodia – Financial Data



MICROFINANCE CUSTOMER JOURNEY

- Loans & Savings Mobilisation
- Gender Gap
- Potential of Big Data analytics to generate insights on the use of financial services

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Indonesia - CCTV Data

IMPROVING TRAFFIC SAFETY

- Jakarta Smart City
  University of Chicago
- Video Analysis
- Automated
  Processing Pipeline

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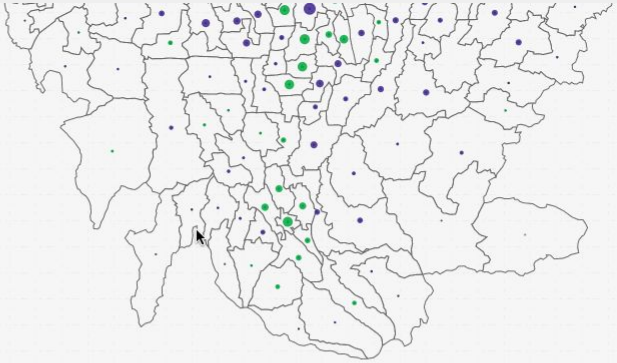
Indonesia - Ride-Hailing Services Data

higher traffic flow into the destination (inflow) and the purple dot represents higher traffic flow going out of the destination (outflow) or equal inflow and outflow.

- Higher inflow
- Higher outflow or Equal inflow/outflow



Differences in Traffic Flows during Weekdays and Weekends

This visualisation compares traffic flows during weekdays and weekends. Differences in traffic patterns in several sub-districts are observed. For example sub-district Menteng, one of the busiest office and business areas in Jakarta, shows higher traffic during weekdays compared to weekends. An opposite trend is seen in commercial and tourist areas, like Bekasi Selatan and Bogor Tengah sub-districts. The colour maps the intensity of traffic in a given sub-district. The purple colour indicates lower traffic and gradually changes to green for higher traffic flows.

Total traffic flow until selected time period

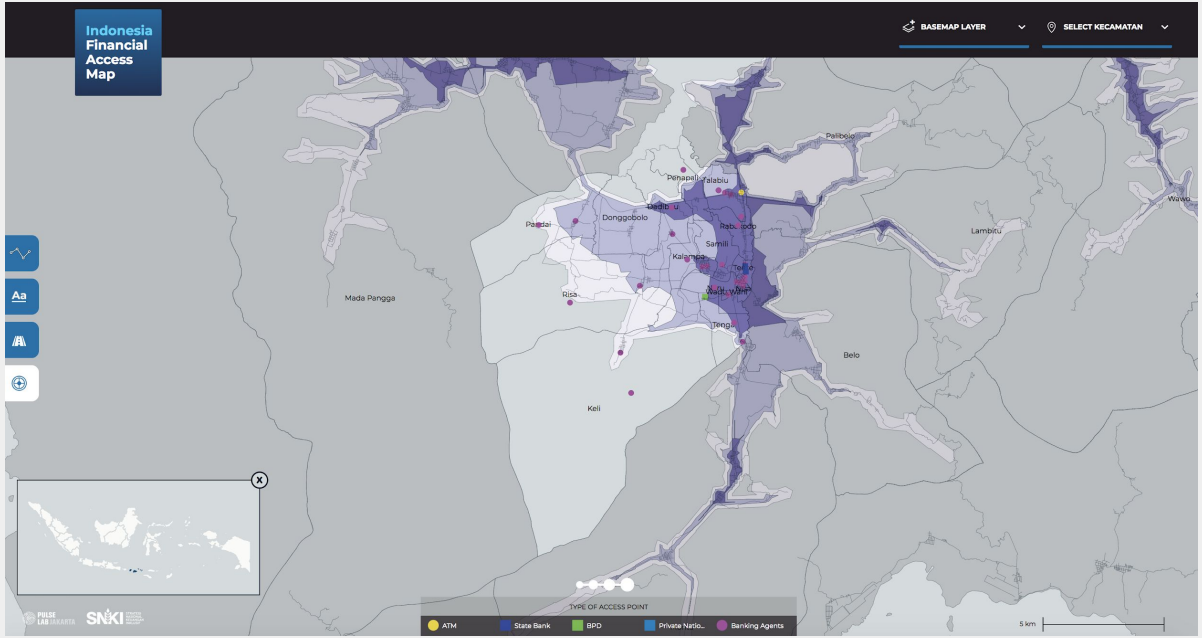
All The Time

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES
17 PARTNERSHIPS FOR THE GOALS

TRANSPORT INTEGRATION

- Traffic Patterns
- 2018 Asian Games
- Grab-UN Research Partnership

Indonesia - Multiple Data Sources

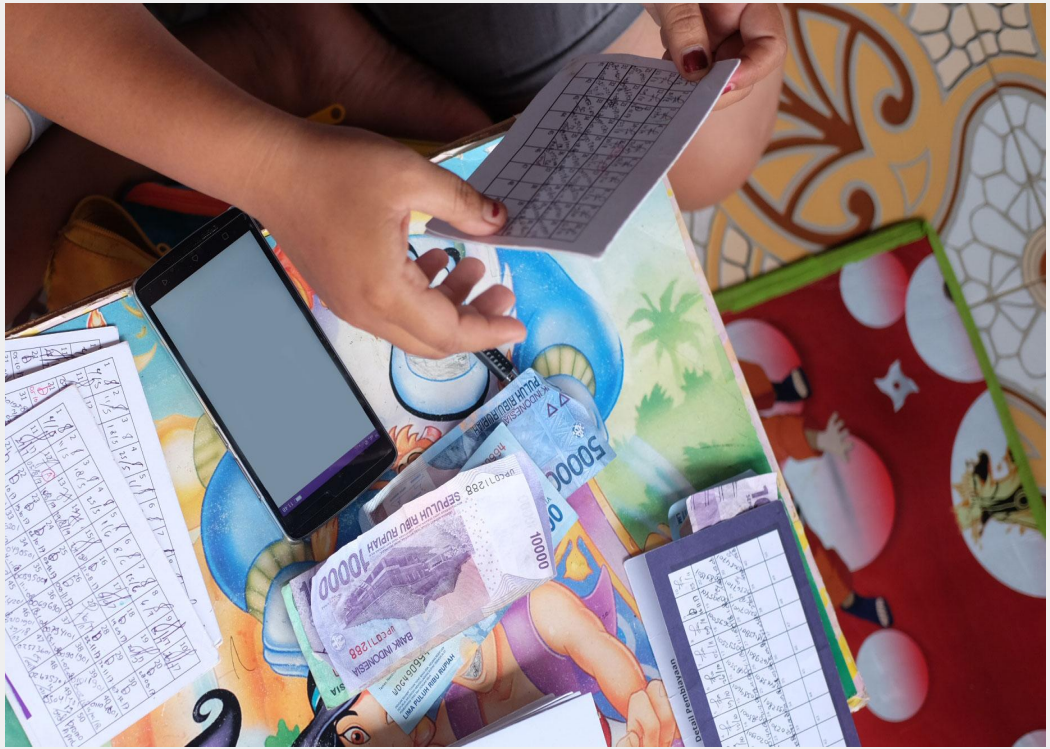


5 GENDER EQUALITY
8 DECENT WORK AND ECONOMIC GROWTH
10 REDUCED INEQUALITIES
17 PARTNERSHIPS FOR THE GOALS

FINANCIAL ACCESS MAPPING

- The Secretariat for the National Council for Financial Inclusion Republic Indonesia and Women's World Banking
- Support inclusive economic development policies.
- Identifying financial access points down to the sub-district / village level.

Indonesia - Human Centered Design



BANKING ON FINTECH

- Financial Inclusion for Micro Enterprises in Indonesia
- Promote resilience and growth
- Indonesia's unbanked micro business sector.

AFTER DARK STUDY

- UN Women
- How women navigate public transportation in the evening time
- Mobility patterns and perceptions of safety

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Mobile Network Data

For Development and Humanitarian Action

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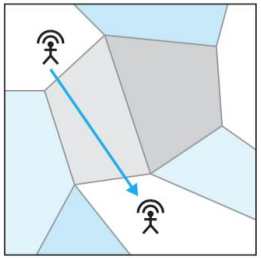
Mobile Network Data:

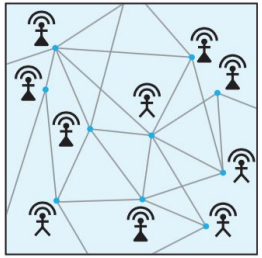
Information elements in call detail records (CDRs) typically for billing purposes and summaries of subscribers' anonymous mobile activities, such as phone calls, text messages and data connections.

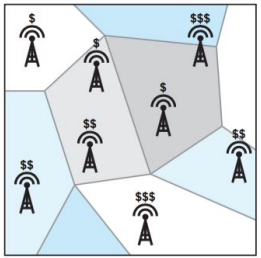
Zero information on content!

Can provide insights on:

- Citizens mobility
- Social interaction
- Economic activity
- Among others







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Privacy - First and Foremost

We comply with the GSM Association privacy guidelines that stipulate:

- That user data be anonymized;
- That user data not be transferred outside of the mobile network operator’s systems;
- That all analysis take place on the mobile network operator’s systems and under operator’s supervision;
- That no analysis be undertaken that singles out identifiable individuals; and
- That only the output of the analysis be made available to relevant and approved government, international, and research agencies

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Case Studies

Papua New Guinea and Vanuatu

POVERTY MAPPING

Papua New Guinea

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(a) Education (b) Household Characteristics (c) Household Ownership

Mobile Phone Data Indicators		E7	Education completed - Form 3 certificate	HC5	# HH with main source of lighting from generator	HO5	# HH owning freezer
M1	Total Number of Calls and SMSs	E8	Education completed - Year 10 leaving certificate	HC6	# HH with main source of lighting from solar	HO6	# HH owning computer
M2	Total Duration of Calls	E9	Education completed - Senior secondary certificate	HC7	# HH with main source of lighting from kerosene	HO7	# HH owninginternet
M3	Number of Unique Customers from Topup Records	E10	Education completed - University entrance	HC8	# HH with main source of lighting from gas	HO8	# HH owninggenerator
M4	Total Number of Topup Transactions	E11	Education completed - College	HC9	# HH with main source of lighting from coleman	HO9	# HH owningmobile phone
M5	Number of Unique Customers from CDRs	E12	Education completed - Bachelor degree	HC10	# HH with main source of cooking energy from kerosene	HO10	# HH owning telephone
M6	Total Number of SMSs	E13	Education completed - Master degree	HC11	# HH with main source of cooking energy from electricity	HO11	# HH owning gas stove
M7	Total Number of Calls	E14	Education completed - Vocational certificate	HC12	# HH with main source of cooking energy from wood	HO12	# HH owning boats
M8	Total Amount of Topup	E15	Education completed - Others	HC13	# HH with main source of drinking water from piped private	HO13	# HH owningmotor vehicle
M9	Average Amount of Topup per User	E16	Population currently attending formal educational institution	HC14	# HH with main source of drinking water from piped shared	HO14	# HH owning motorbike
Education		E17	Population attending formal educational institution - full time	HC15	# HH with main source of drinking water from HH tank	HO15	# HH owning canoe
E1	English literacy	E18	Population attending formal educational institution - part time	HC16	# HH with main source of drinking water from village tank	HO16	# HH having chickens as livestock
E2	French literacy	**Household Characteristics**		**Household Ownership**		HO17	# HH having pigs as livestock
E3	Bislama literacy	HC1	Number of household (# HH) - Rent free	HO1	# HH owning radio	HO18	# HH having horses as livestock
E4	Other language literacy	HC2	#HH - Rent	HO2	# HH owning TV screen	HO19	# HH having cattle as livestock
E5	Education completed - Some primary education	HC3	#HH - Owned	HO3	# HH owning DVD	HO20	# HH having goats as livestock
E6	Education completed - Primary leaving certificate	HC4	# HH with main source of lighting from electricity main grid	HO4	# HH owning mower		

POVERTY MAPPING

Papua New Guinea

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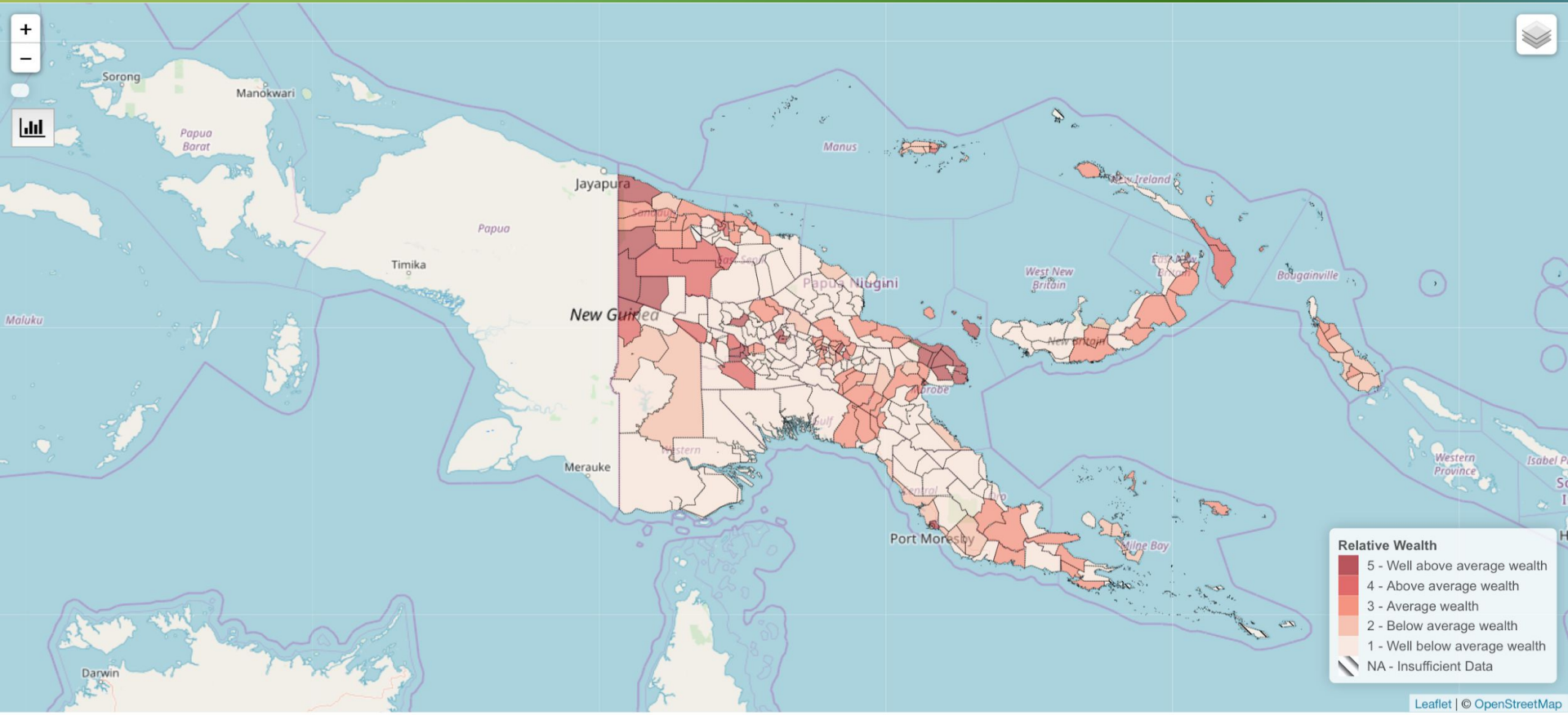

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Case Studies

Mobile Network Data for Disaster

DISPLACEMENT PATTERN AND BEHAVIOR

Highlands Earthquake, Papua New Guinea

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QUANTIFY PATTERN AND BEHAVIOR

Tropical Cyclone Donna, Vanuatu

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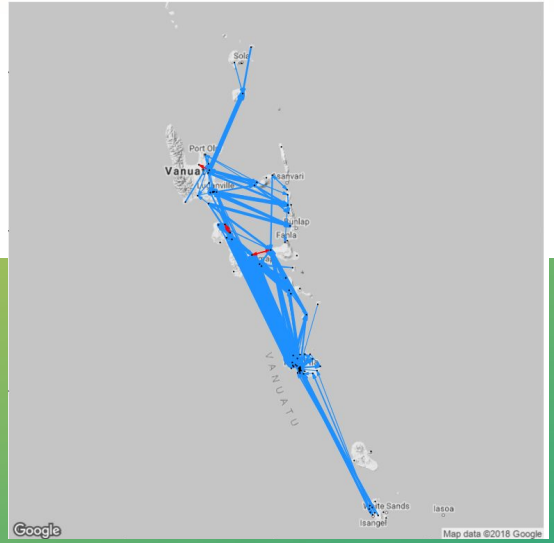
D-1
Before Cyclone

During
Cyclone



D+1
After Cyclone

Each line represents anomalous subscribers flow:

- Red: Decrease
- Blue: Increase

QUANTIFY PATTERN AND BEHAVIOR

Mount Monaro's Volcanic Eruption, Vanuatu

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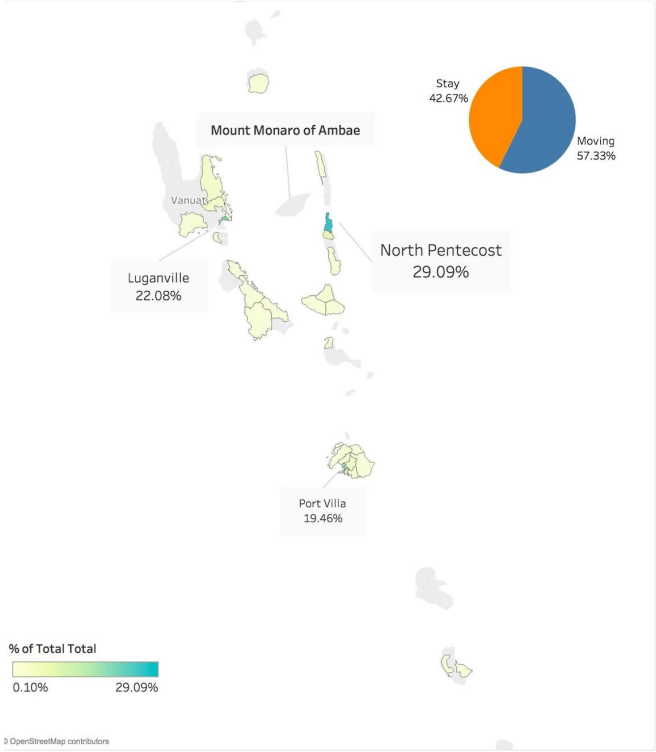
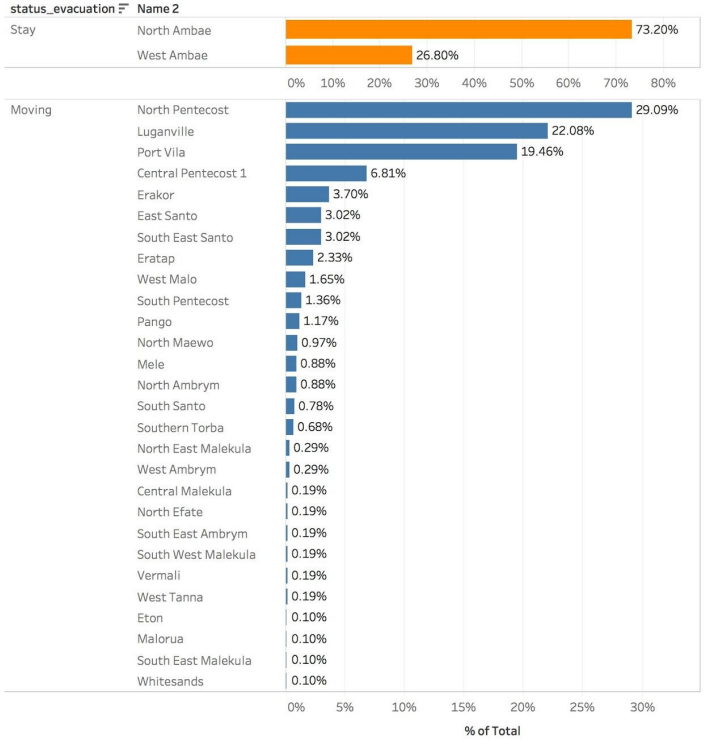
Digicel Users - Evacuation Destination due to 2018 Mount Monaro Eruption
Update : 23 August 2018





ALIGNMENT WITH REALITY

Mount Monaro's Volcanic Eruption, Vanuatu

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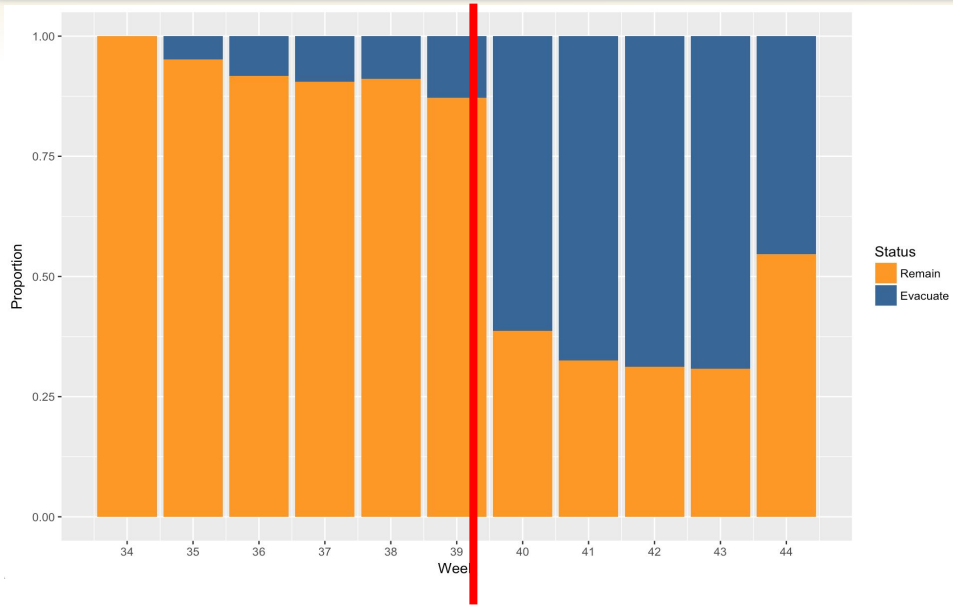
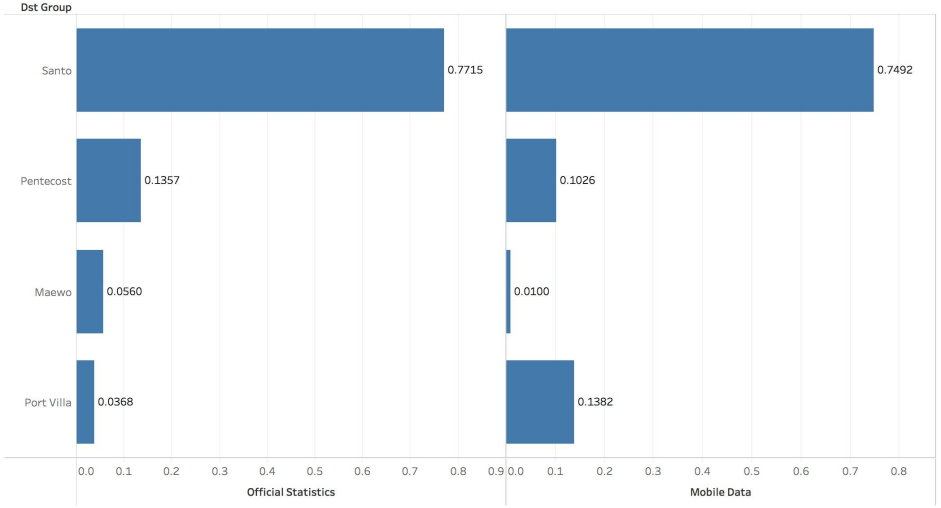


Eruption
Evacuation Order



PREDICTING DISPLACEMENT

Mount Monaro's Volcanic Eruption, Vanuatu

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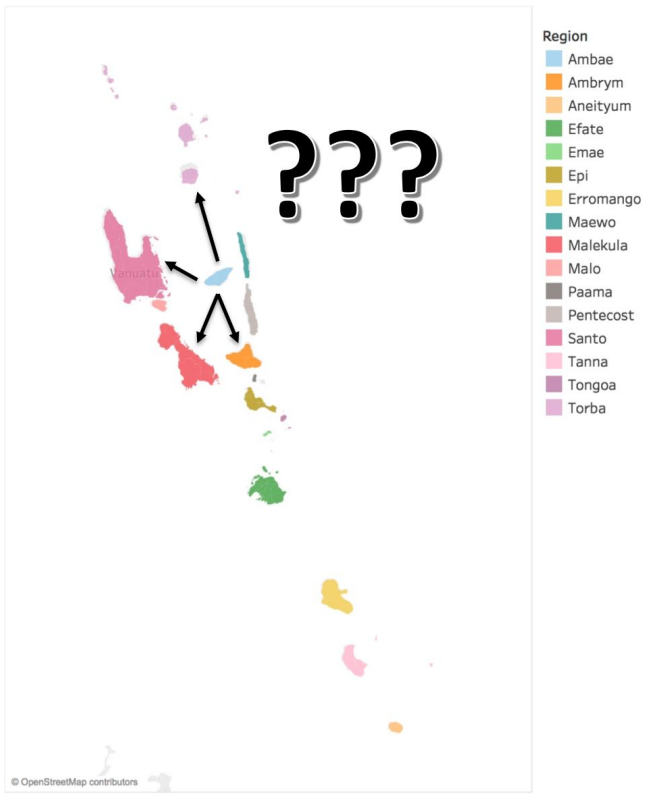

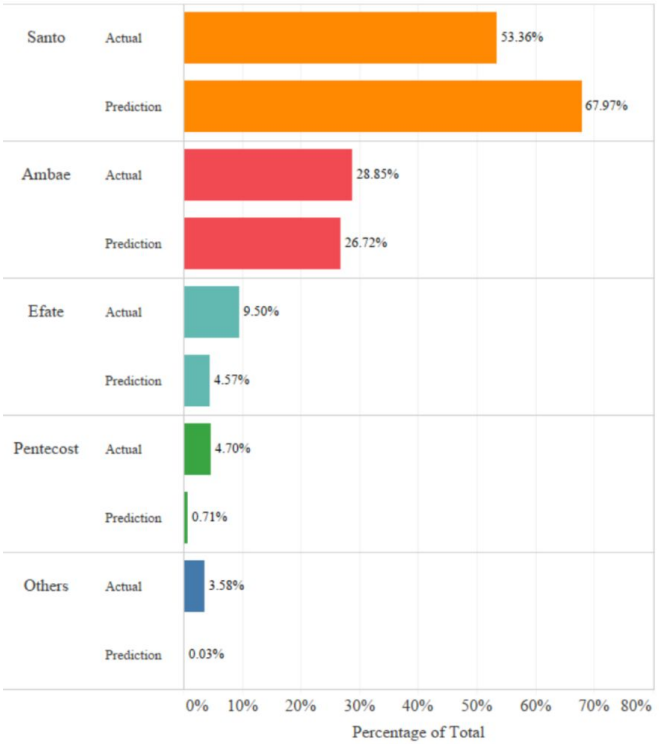

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Behind The Scenes

PROJECT TIMELINE

2016

- **Jan:** 1st meeting
- **Feb:** NDA
- **May:** MoU
- **Aug:** Visit Fiji
- **Nov:** Data Access

2017

- **April:** Use case 1 published

2018

- **April:** Use case 2&3A published
- **May:** Presented Use case 2&3A, request
- **June:** Use case 3-B
- **Oct:** Paper on Use case 3

2019

- **March:** Interest for follow up research

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Harnessing data for development.
Translating insights for social innovation.

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