**54th Session of the United Nations Statistical Commission // Side Event
Use of Mobile Phone data for statistics and indicators
16 February 2023**

Introduction: Applications of mobile phone big data

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UN-CEBD Mobile Phone Data Task Team (Chair)

Outline

- **Introduction**

- **Methodological guides**

- **Applications of mobile phone data**

- **Way forward**

UN Committee of Experts on Big Data and Data Science for Official Statistics (UN-CEBD)
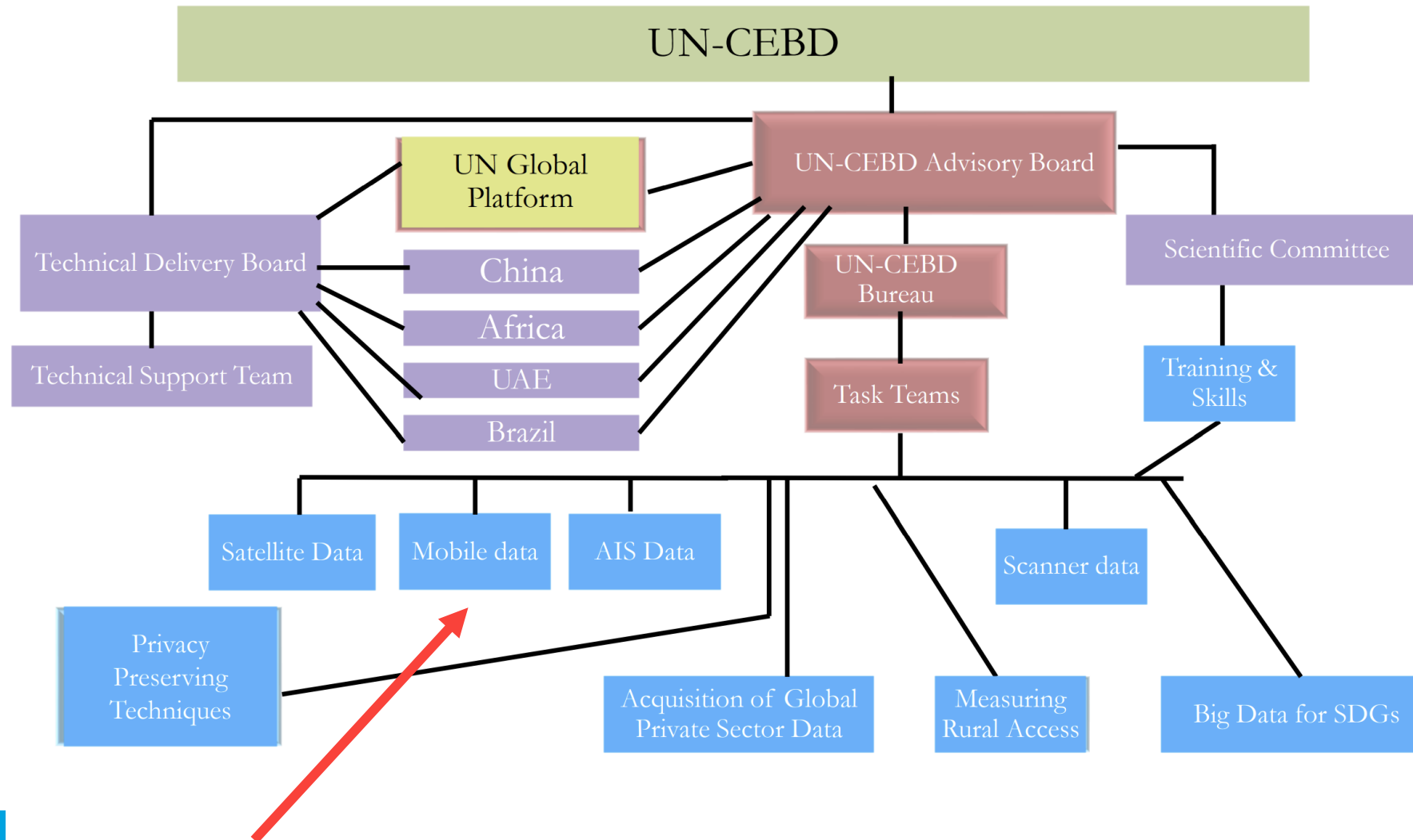
UN-CEBD Task Team on Mobile Phone Data (MPD)

- Established since the inception of the UN Committee of Experts on Big Data and Data Science for Official Statistics (UN-CEBD)
- Explore the use of mobile phone big data for the different areas of statistics and develop methodologies
- Composed of around 50 individual members/ 30 entities - international and regional agencies, countries, academia, private agencies/companies
- Meets (virtually) once a month to discuss issues related to the deliverables, events, and other activities

Lead: ITU

Members:

- Brazil
- Colombia
- Gambia
- Georgia
- India
- Indonesia
- Italy
- Japan
- Korea
- Malaysia
- Mexico
- Netherlands
- Oman
- Philippines
- Romania
- Saudi Arabia
- United Arab Emirates

- EU JRC
- Eurostat
- IMF
- IOM
- UNFPA
- UNGP Jakarta
- UNSD
- World Bank
- OECD-ITF
- UN-ECE
- Flowminder
- GSMA
- Positium
- Telenor

Methodological Guides on the use of Mobile Phone Data (2022)

1) **Tourism statistics (lead: BPS Indonesia)**

2) **Migration statistics (Lead: GeoStat, Georgia)**

3) **Census and dynamic population (lead: Positium)**

4) **Displacement in disaster context (lead: University of Tokyo)**

5) **Information society indicators (lead: ITU)**

6) **Transport and commuting statistics (lead: ECE & UAE)**

https://unstats.un.org/bigdata/task-teams/mobile-phone/index.cshtml

Application: Tourism statistics

Cross-border travellers and tourists with their movement paths at the Border between Indonesia and Timor Leste based on mobile positioning data
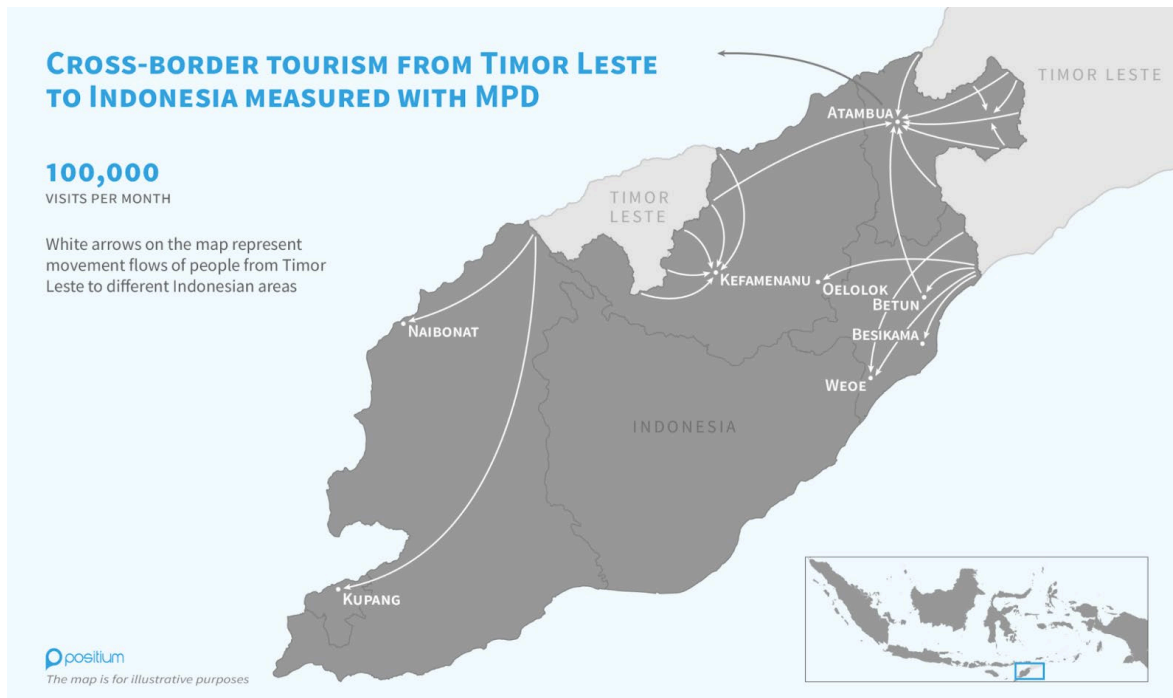

Source: Positium.

❖ Existing data sources had coverage issues.

❖ Surveys were limited in scope, with data collection only taking place over a month and only in select locations to estimate results for one-year time period for the whole border.

❖ Immigration data did not account for areas where there is no border checkpoint

❖ Conducting surveys was expensive

✓ BPS-Statistics Indonesia has been using MPD for official tourism statistics since 2016

✓ Implemented to measure mobilities within Indonesia's border regions - movements to and from the country

See: Methodological guide on the use of mobile phone data: Tourism Statistics, https://unstats.un.org/wiki/display/MPDTS

Application: Migration indicators

Comparison of flows for internal migration between counties in Estonia according to census 2011 and MPD during the period 2010–2011. N= number of migrants between counties (LAU level 1).

a.2. Census data
N = 29 543

b.2. MP data
N = 26 633
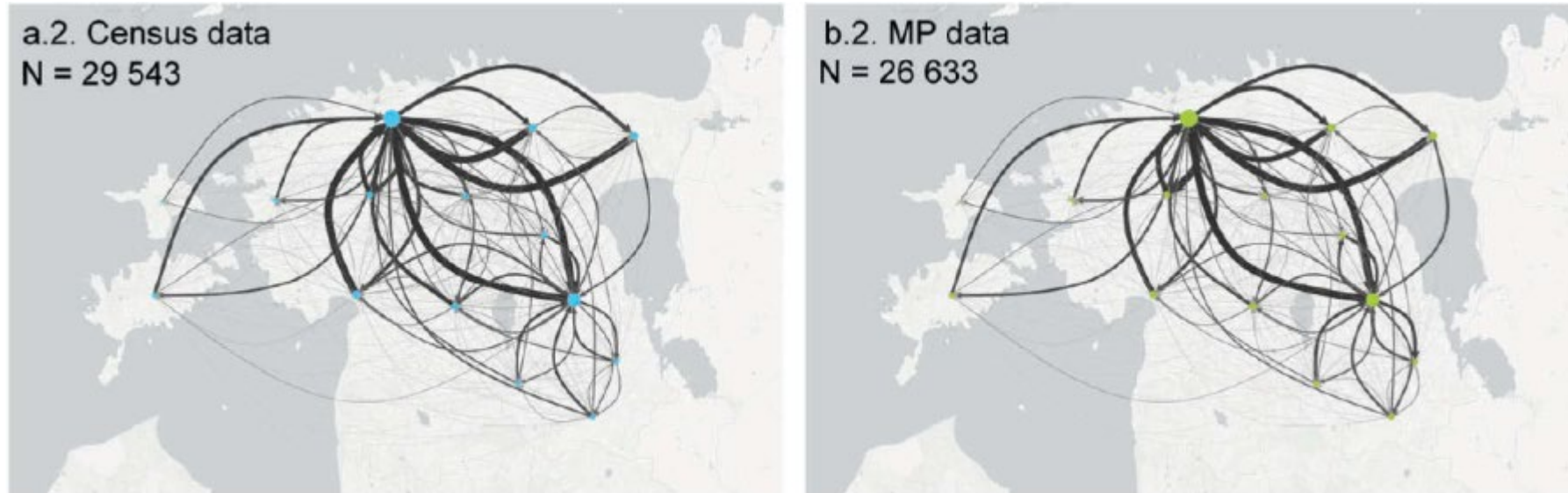
The use of MPD can improve several aspects of migration statistics:
- ✓ timeliness
- ✓ access to statistical information previously unavailable
- ✓ calibration opportunities for existing data
- ✓ granularity

See: Methodological guide on the use of mobile phone data: migration statistics, https://unstats.un.org/wiki/display/MPDMS

Application: Dynamic Population Mapping

Aims to answer - how to **map population dynamically** - without being dependent on logistics of surveys or the census

& how to **map a dynamically-behaving population** - understanding de facto presence at any time, even away from place of residence
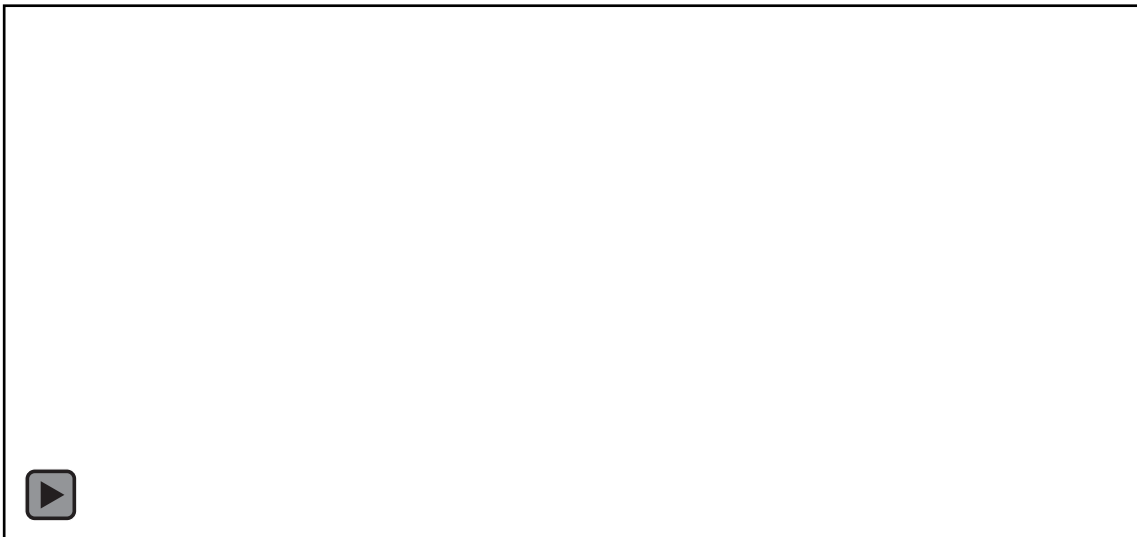
8 MPD use cases for population:

1. Resident population mapping
2. Daytime population mapping
3. De facto population mapping
4. Monitoring population redistributions caused by COVID-19 mobility restrictions
5. Infrastructure and resource planning
6. Creating dynamic sample frames for surveys
7. Census
8. Disaster preparedness planning and response

See: Methodological guide on the use of mobile phone data: Dynamic population mapping, https://unstats.un.org/wiki/display/MPDDPM

Application: Displacement in disaster context

Changes in population counts after the earthquake (Haiti)
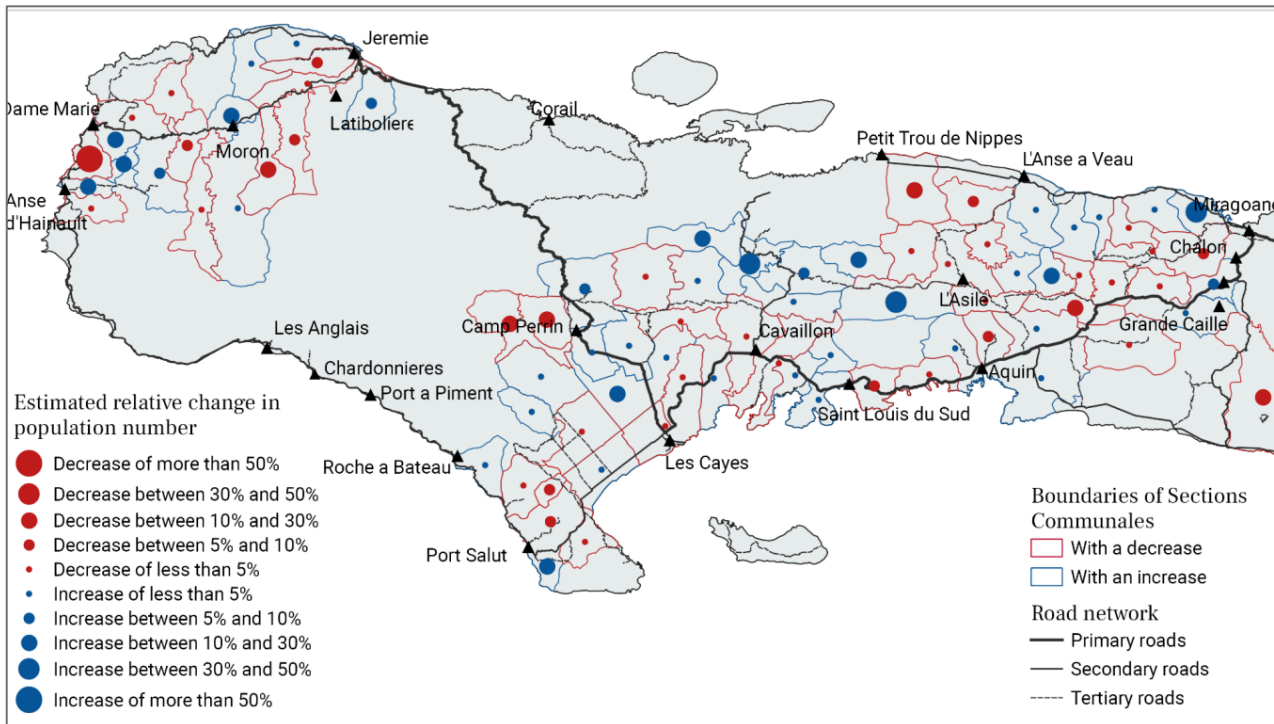
Source: Flowminder 2021 Haiti Earthquake Reports 2

Following the Earthquake in Haiti , several questions that were important to the humanitarian response needed to be addressed:

- In which area were people most impacted by the earthquake?
- Where were people affected by the earthquake displaced to?

Possible to estimate:
- ✓ the numbers of people displaced from the areas most directly impacted by the earthquake
- ✓ the areas people had been displaced to
- ✓ And the disruption to transportation in the affected areas

See: Methodological guide on the use of mobile phone data: Displacement and Disaster Statistics, https://unstats.un.org/wiki/display/MPDDS/
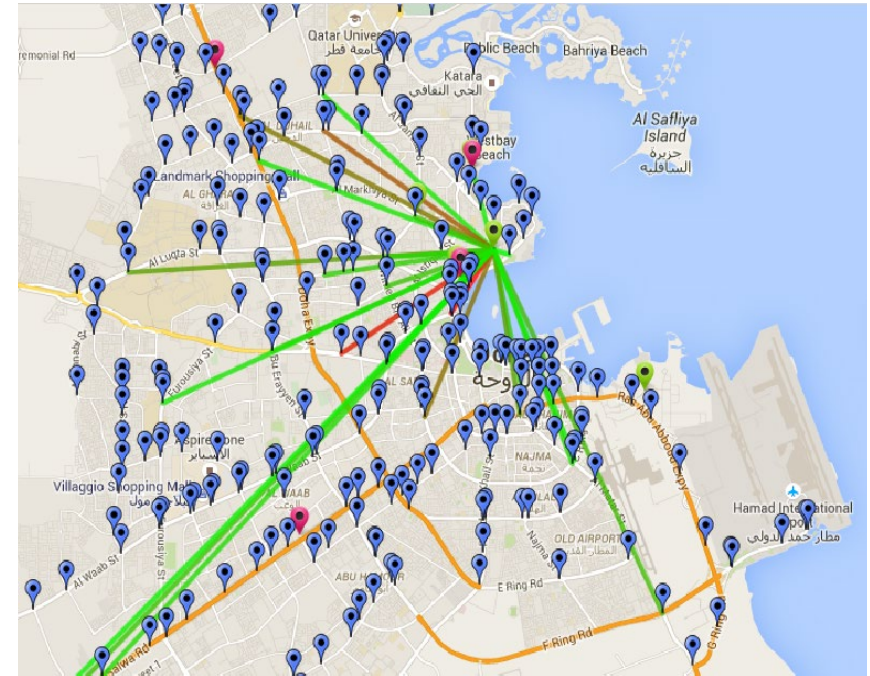
Application: Information society (SDG) indicators

Percentage of the population using the Internet, Brazil, 2021
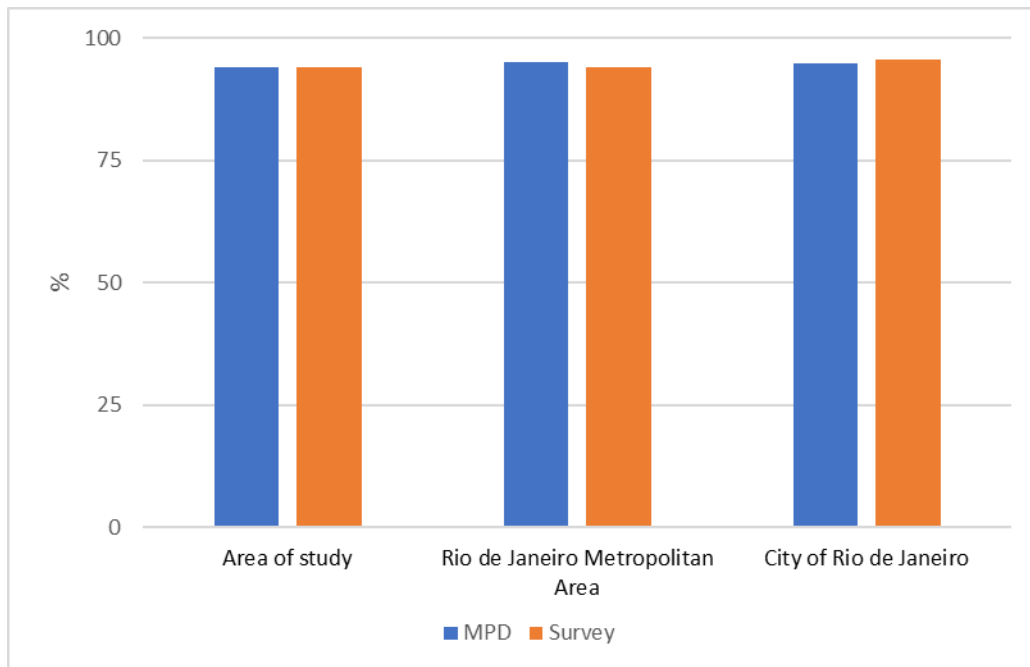
❖ Surveys to collect data on Internet use are not conducted in many countries - lack of resources

❖ The lack of official data presents a challenge for monitoring SDGs

✓ suggest that MPD can be used to calculate the two SDG indicators - Brazil and Indonesia

✓ The two SDG ICT indicators - timely and with greater spatial resolution

See: Methodological guide on the use of mobile phone data: information society SDG indicators, https://unstats.un.org/wiki/display/MPDMIS

Application: Transport Statistics

✓ Origin-Destination matrices between regions

✓ Public transport statistics (particularly when monthly passes are used)

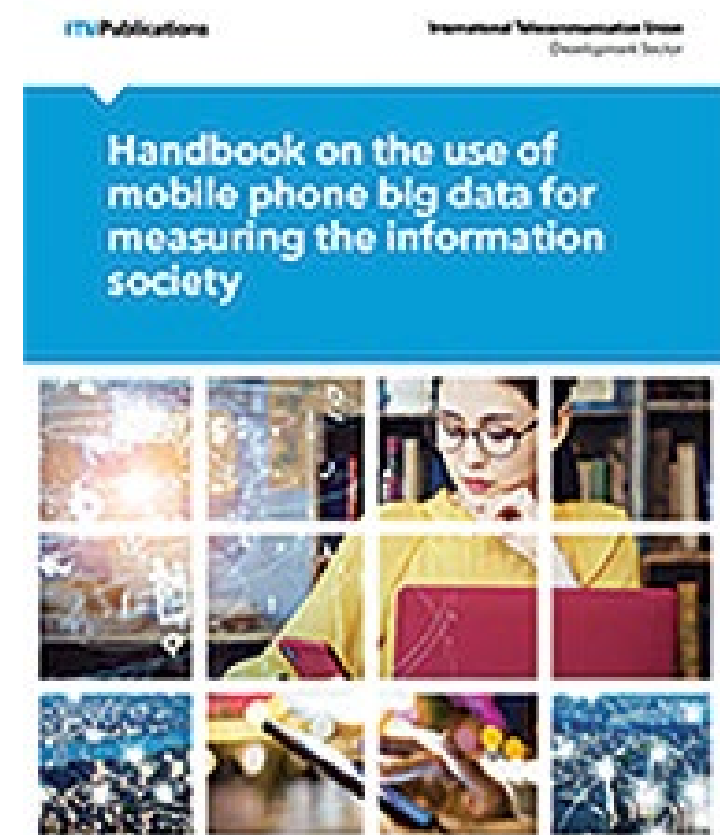✓ Urban mobility, especially walking and cycling

✓ Transport planning

See: Methodological guide on the use of mobile phone data: Transport Statistics (to be available soon)

Methodological guide on the use of mobile phone data: information society SDG indicators

1. Introduction
2. Background
3. Access and preparations
4. Data sources (description of mobile operator data, quality assurance of raw data)
5. Reference data (local admin units, world population, cell data, digital elevation, household survey data)
6. Data processing (models, data protection guidelines)
7. Calculating the indicators (rationale, definition, indicators calculation, quality assurance)
8. Quality assurance
9. Conclusions

- with experiences and examples from country pilots

ITU Publications — International Telecommunication Union Development Sector

Handbook on the use of mobile phone big data for measuring the information society

Way forward

- Complete the Guidelines on Transport statistics

- Disseminate the awareness training course

- Develop training materials, including e-learning courses, on the six Guidelines

- Conduct training workshops to support regional capacity development, in collaboration with regional hubs

- Participate actively in international events to raise awareness on the Guidelines

- Prepare synthetic data sets to be used for the preparation of training materials and delivery of the trainings

- Develop step-by-step/non-technical methodology on how to use MPD for official statistics and indicators

Please contact: magpantay[at]itu.int

https://unstats.un.org/bigdata/task-teams/mobile-phone/index.cshtml

https://www.itu.int/en/ITU-D/Statistics/Pages/bigdata/default.aspx

Thank you!

Five key principles for maintaining public trust

- when using of mobile phone data:

1. Necessity and proportionality
2. Professional independence
3. Privacy-conscientiousness
4. Commitment to quality
5. International comparability

In general, processing MPD for statistical purposes shall be subject to:

- appropriate safeguards,
- privacy best practices, and
- relevant laws, including GDPR, to protect the rights and freedoms of the data subject.

Those safeguards shall ensure that technical and organizational measures are in place to comply with the principle of data protection. Those measures may include, but are not limited to, pseudonymization. Pseudonymized data remains personal data, and relevant data protections laws continue to apply.

Jansen, R., Kovacs, K., Esko, S., Saluveer, E., Sõstra, K., Bengtsson, L., . . . Magpantay, E. (2021). Guiding principles to maintain public trust in the use of mobile operator data for policy purposes. Data & Policy, 3, E24. doi:10.1017/dap.2021.21

Activities of UN-CEBD MPD Task Team

2023-2022:

- UNSC Side event - February 2023
- Big data conference – November 2022
- Awareness raising training course – Q42022
- Release of Guidelines – Nov 2022
- MPD Promotional video – June 2022
- Mobile Tartu – 29-30 June 2022
- UNECE – MPD for Transport Statistics - 15 June 2022
- WSIS Forum 2022 – MPD for information society session – May 2022
- EXPO2020 – MPD session, Dubai, January 2022

2021:

- Data and Policy Journal 2021 – Guiding principles for MPD
- UN World Data Forum 2021 – Oct 2021
- Road to Expo2020 – Nov 2021
- Invited Paper Sessions on the use of MPD for official statistics at the ISI (July)
  - Use of Mobile Phone Data to measure SDG ICT Indicators
  - Exploring Statistics on Tourism, Migration, Population and Displacement by Using MPD
- Measuring the information society using new data sources, WSIS Forum 2021 (May)
- Oman's Experience in Utilizing MPD for official statistics (April)
- MPD for official statistics – addressing data accessibility, privacy and regulatory issues (UN ESCAP StatsCafé, April)

Previous events:

- 6th International Conference on the Use of Big Data 2020 (hosted by Korea)
- Mobile Tartu Conference, Asia Pacific Statistics Week 2020
- ITU World Telecommunication/ICT Indicators Symposium 2020
- Conducted workshops in Colombia (2017, Rwanda (2019) and Indonesia (2019)
- Organized the International meeting on measuring human mobility in Georgia (2019)