Mobile network big data for Disaster Risk Reduction

Rohan Samarajiva

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Canada

Mobile networks can contribute in different ways

- Immense potential for early warning because of ubiquity of always-on devices carried on the person
  - E.g., cell broadcasting which, if based on Common Alerting Protocol, can communicate geographically targeted messages and is immune to congestion
- But focus of this presentation is on big data generated as a by-product of the operation of mobile services
  - Our focus is on Mobile Network Big Data (MNBD) because it represents all phones, smart and otherwise

Mobile Network Big Data is most representative at this time

	Mobile SIMs/100	Internet users/100	Facebook users/100
Myanmar	50	2	12
Bangladesh	76	10	9
Pakistan	73	14	11
India	73	18	9
Sri Lanka	107	26	16
Philippines	112	40	41
Indonesia	125	17	25
Thailand	143	35	49

Source: ITU Measuring Information Society 2014; Facebook advertising portal

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Visitor Location Registry (VLR) & Call Detail Records (CDR) data

- VLR data are generated with no human intervention: every mobile device periodically signals its presence to the nearest base station
  - Massive volumes; not routinely stored
- Call Detail Records (CDRs) are meta data recording actions by customers needed for billing purposes, not content of communications
  - Records of calls
  - SMS
  - Internet access
  - Airtime recharge records
- Both VLR and CDR data provide data not only on "who called whom" type actions, but also of movement through time and space
- Data sets need not include any Personally Identifiable Information
  - LIRNEasia has obtained historical, pseudonymized MNBD from multiple mobile operators in Sri Lanka

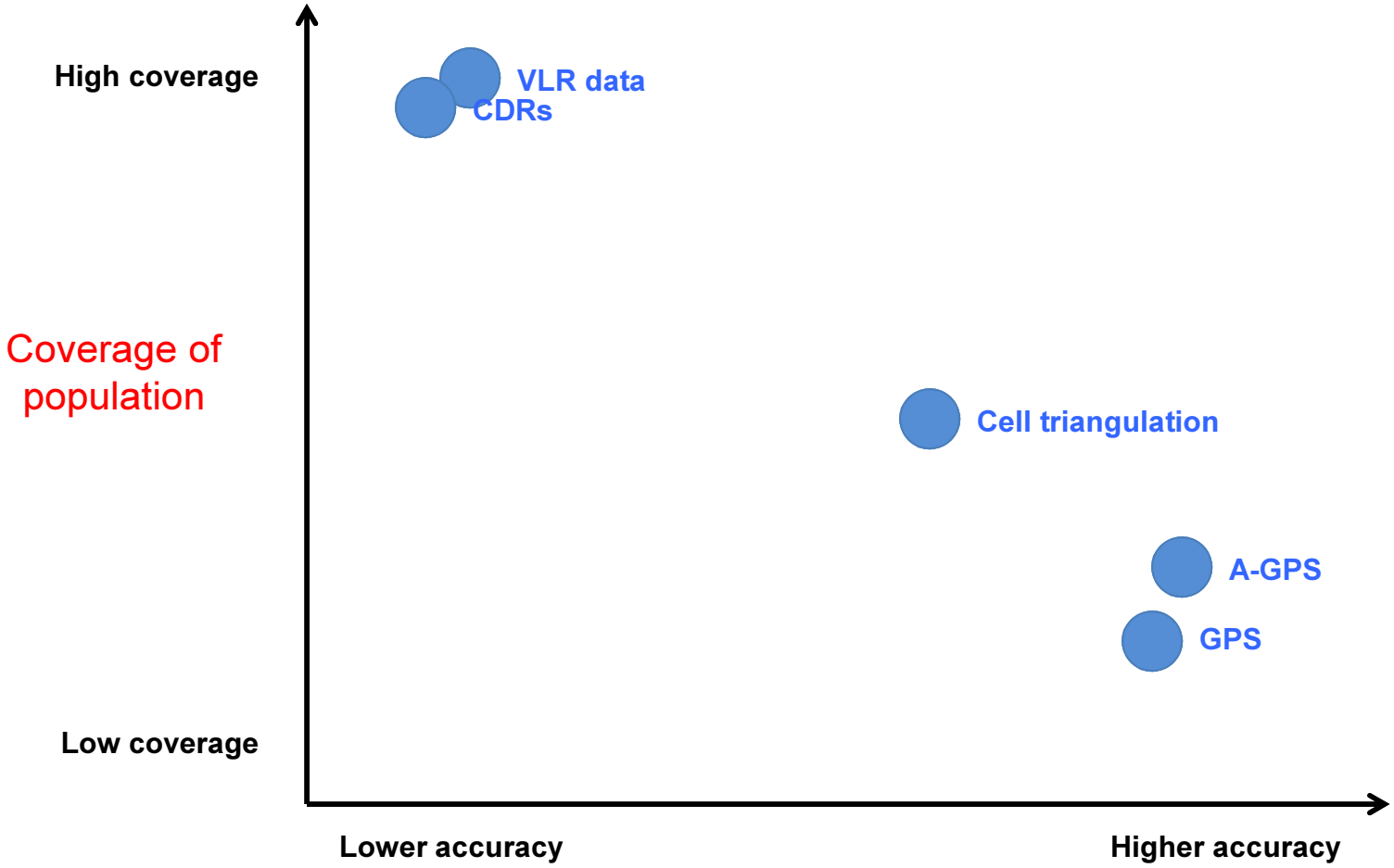
What MNBD can do for DRR, response and relief

- It can produce high-frequency and granular reports on how people move around
  - Useful for informed urban planning, which would ideally have DRR built in
  - Special insights relevant to spread of infectious diseases
  - Normal movement patterns can be baseline for evacuation planning
    - Abnormal patterns can yield insights
  - Also useful for reconstruction planning
- Can locate congregations quickly after a disaster so relief can be supplied
- Reload data in aggregate can also yield relief & recovery related insights

How can the location of a mobile subscriber be determined

- GPS
- Assisted GPS (A-GPS)
  - GPS + triangulation using cell towers
- Pure cell triangulation
  - Time of Arrival (ToA)
  - Angle of Arrival (AoA)
- Passive location data (i.e. Cell antenna coordinates)
  - VLR
  - CDRs, etc.

Most handsets are not GPS enabled in developing economies



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Other limitations

- ıs triangulation of every phone in a
- ; not always feasible
- ıs storage of VLR data is costly since
  nes are huge
- s event based → there are gaps
  ıg to understand individual mobility