Mobile Phone Data for Official Statistics: Elements for a Production Framework

BigSurv 2018

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Overview

1. Deliverable **5.1**:

   Current **status of access** to mobile phone data in the ESS (July, 2016)

2. Deliverable **5.2**:

   Guidelines for the access to mobile phone data within the ESS (May, 2017)

3. Deliverable **5.3**:

   Proposed elements for a **methodological framework** for the production of official statistics with mobile phone data (Feb, 2018)

4. Deliverable **5.4**:

   Some **IT elements** for the use of mobile phone data in the production of official statistics (March, 2018)

5. Deliverable **5.5**:

   Some **quality aspects and future prospects** for the production of official statistics with mobile phone data (May, 2018)

+ Meeting **Minutes** + **Github** Page

Big Data definition revisited

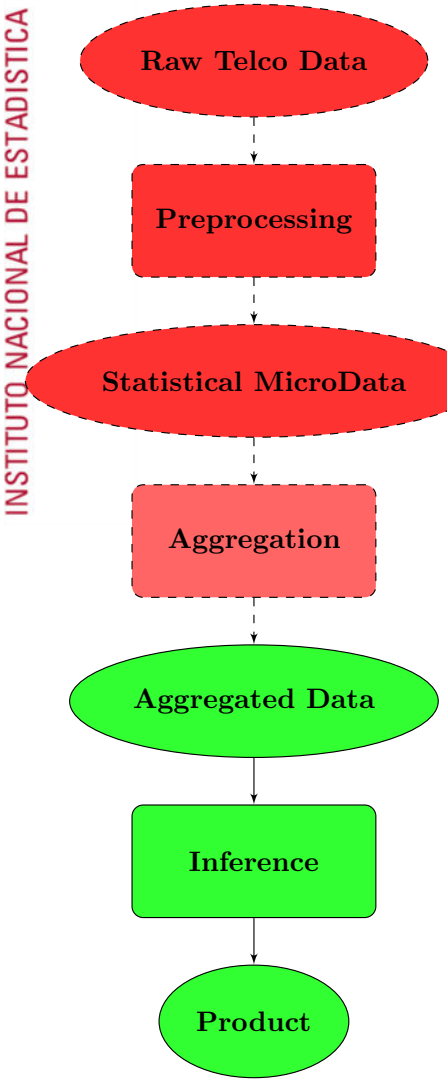
Big Data ***for Official Statistics***

- refer to **third people** and not to data holders;
- are **central in their economic activity**;
- **lack statistical metadata** (since they are generated for very different purposes).

UNECE (wider) Definition for **Admin Data**:

“Data collected by sources **external to statistical offices**.”

The process in a nutshell



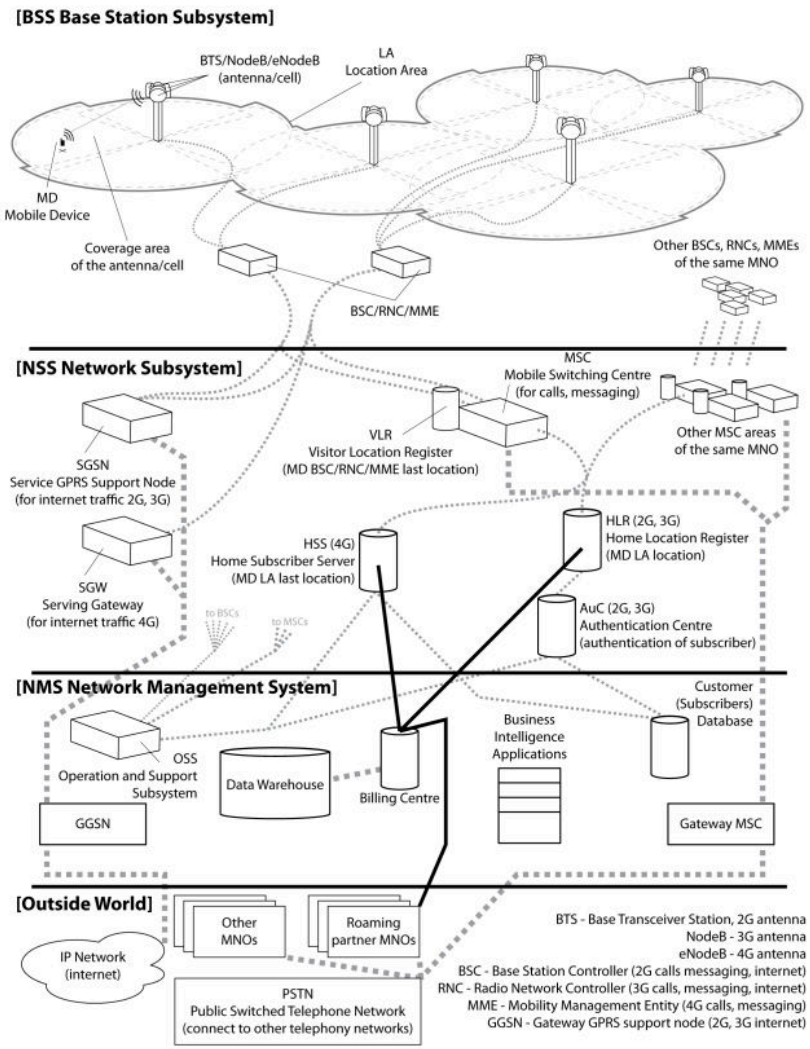
MobPhone Data (WP5)

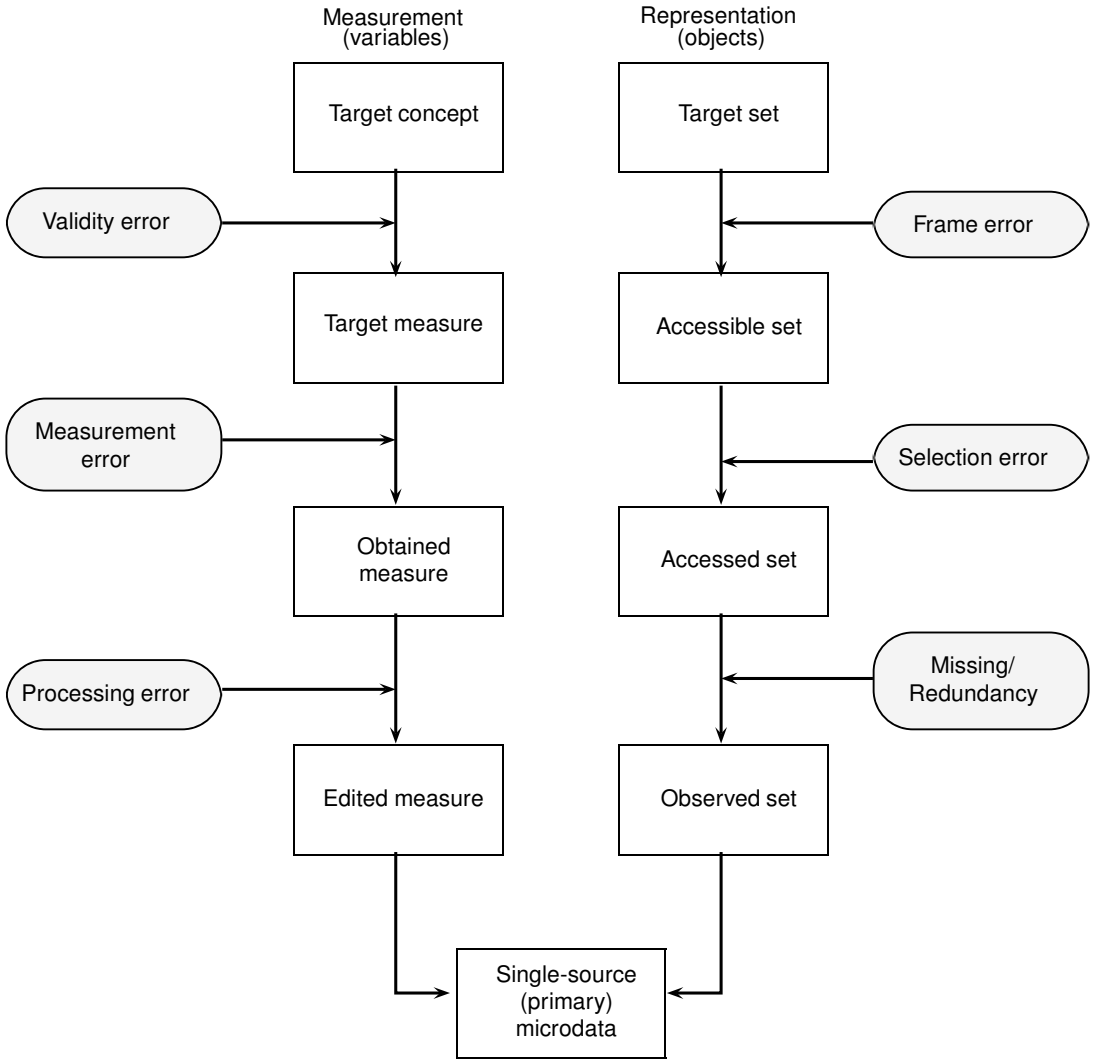
- Phase 1: Raw Telco Data Generation
- Phase 2: Statistical MicroData Generation
- Phase 3: Aggregated Data Generation
- More phases: Inference

Admin Data (Reid et al., 2017)

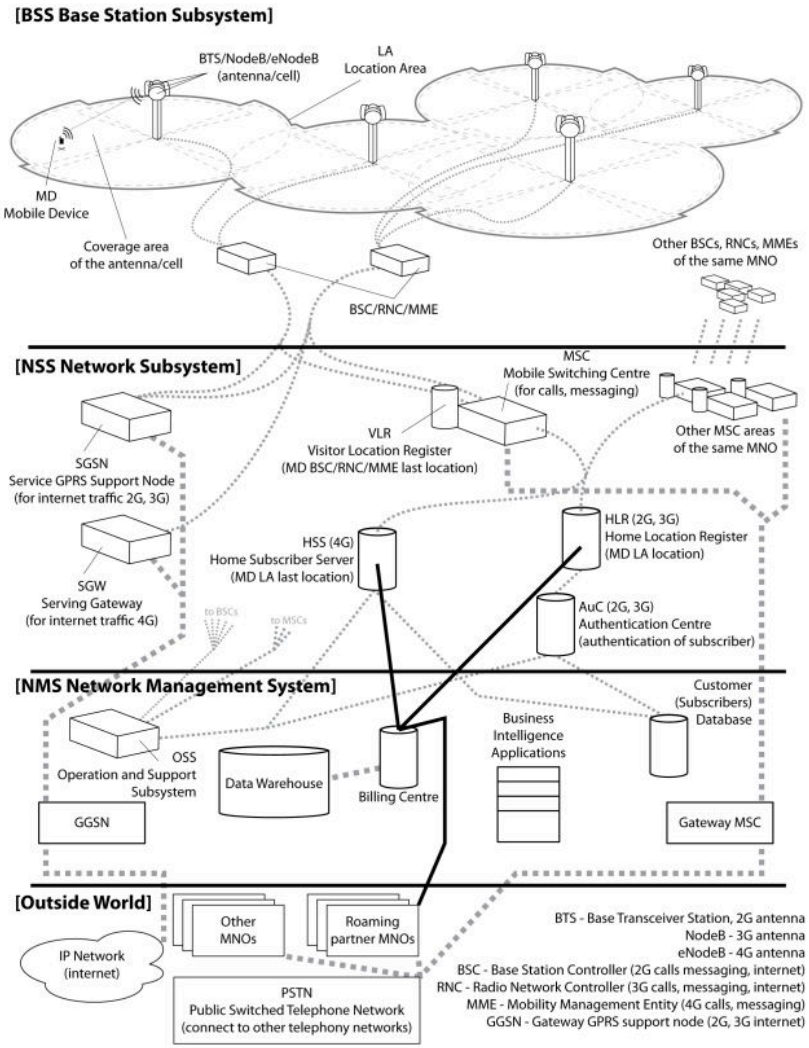
- Phase 1: Admin Data Generation
- Phase 2: Statistical MicroData Generation
- Phase 3: Inference to Target Population

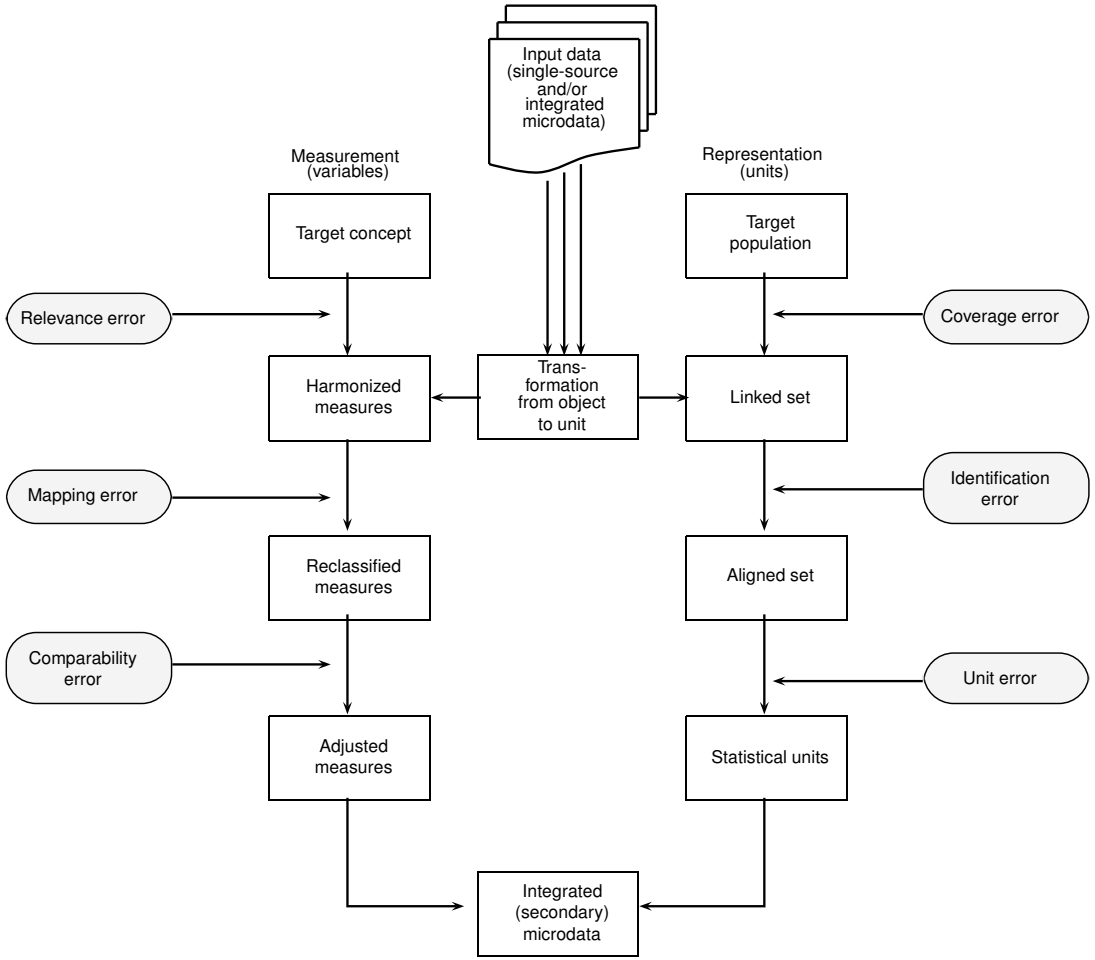
Data generation: Phase 1





Data generation: Phases 2 and 3



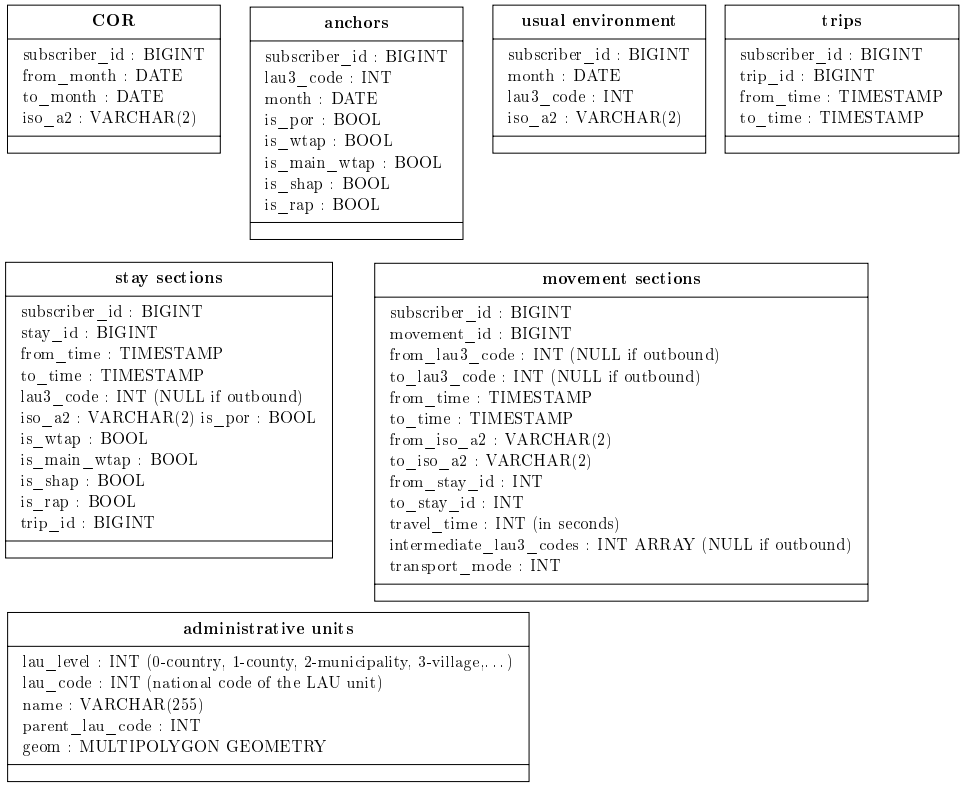


A data model

From

pseudonymised ID, time attributes, space attributes (. . .)

to



Geolocation of network events

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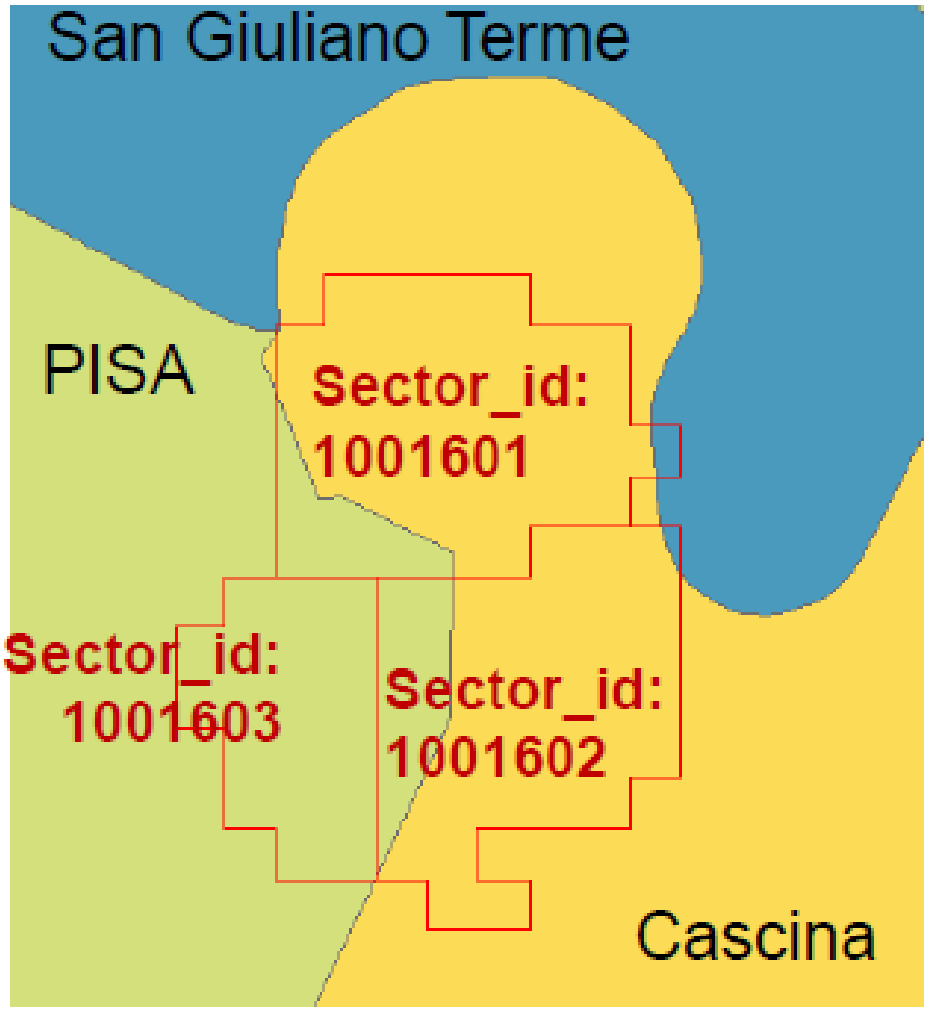
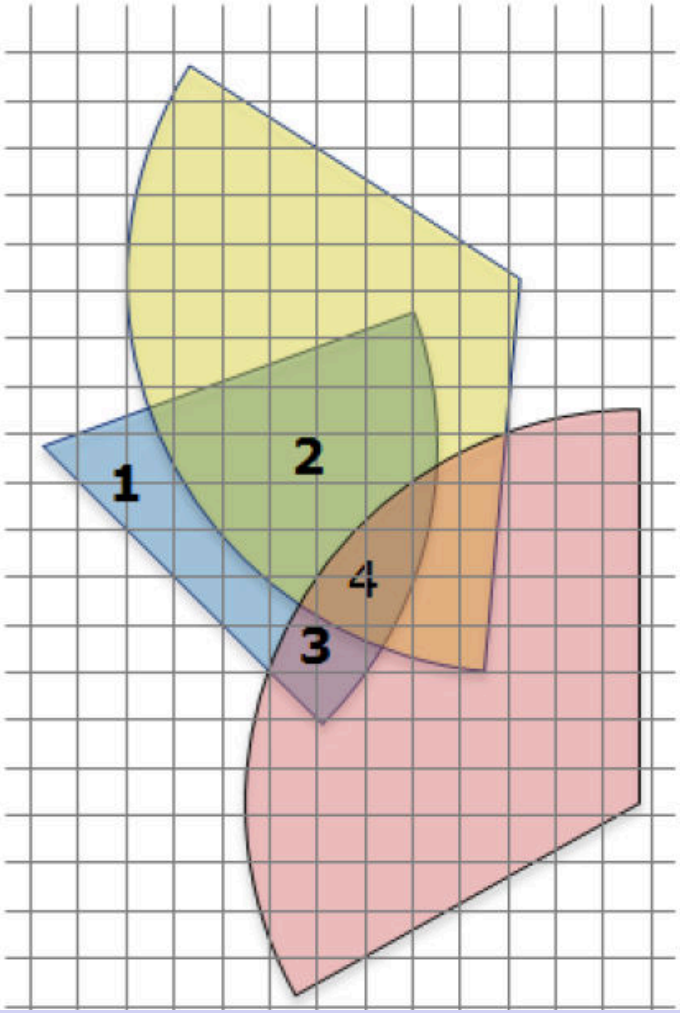
- **Best Service Area** Approach

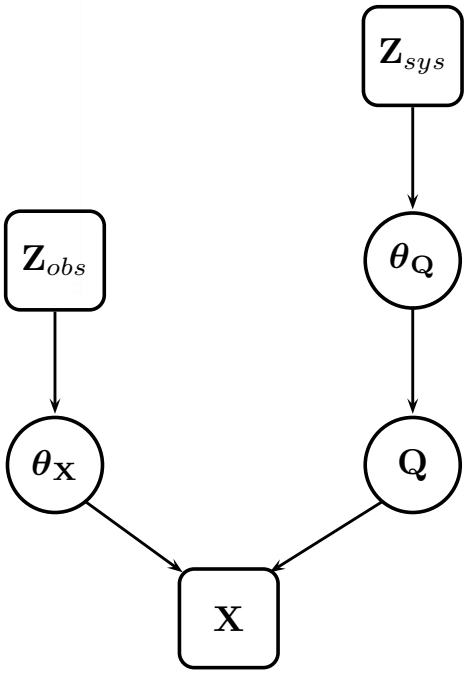


Geolocation of network events

- **Bayesian Approach**

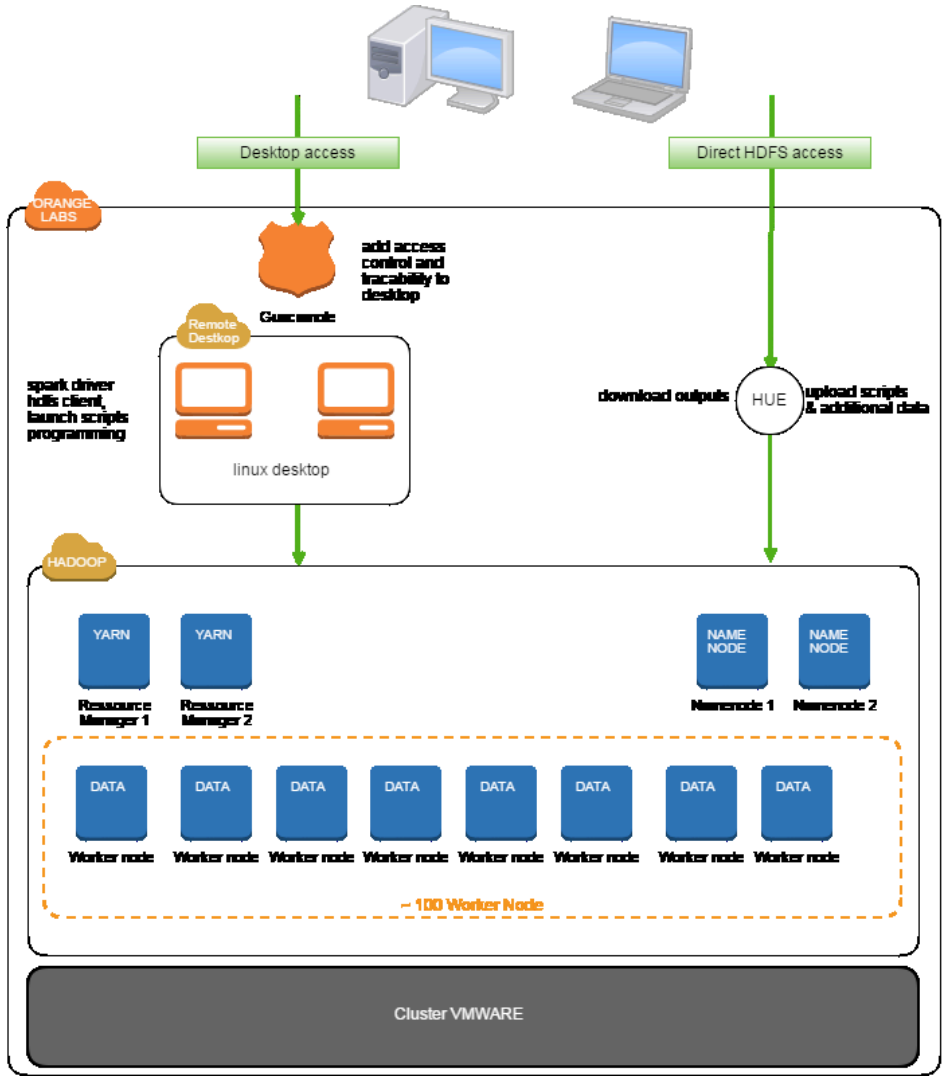


From data to target population: inference



- **Probabilistic sampling** not possible: the **curse of representativity**
- Adaptation of **species abundance problem** in ecological sampling:
  - **Hierarchical** model
  - Two working assumptions:
    - At t_0 individuals are assumed to be physically in the **territorial cell of auxiliary admin/survey data**.
    - Mobility patterns of individuals **do not depend on the concrete MNO** they are subscribed to.
  - **Bayesian** approach:
    - **Computational** scalability.
    - **Integration** with other data sources.

IT infrastructure



Package `mobloc`

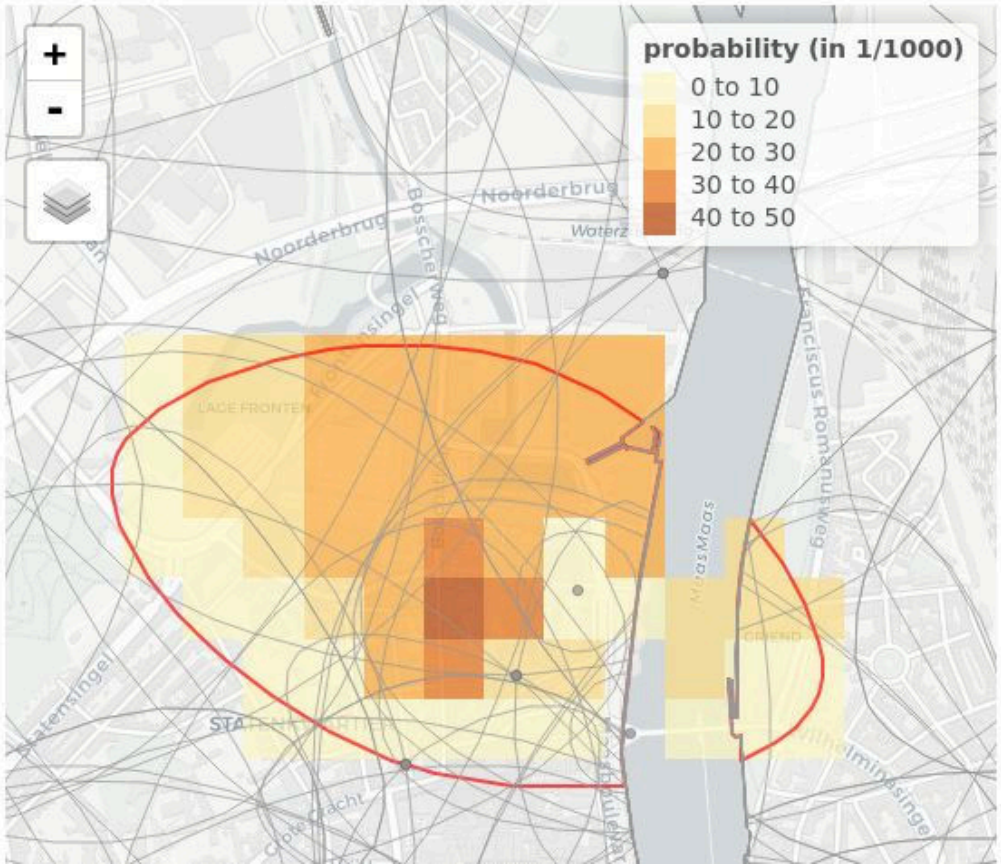
Cell Inspection Tool

Variable

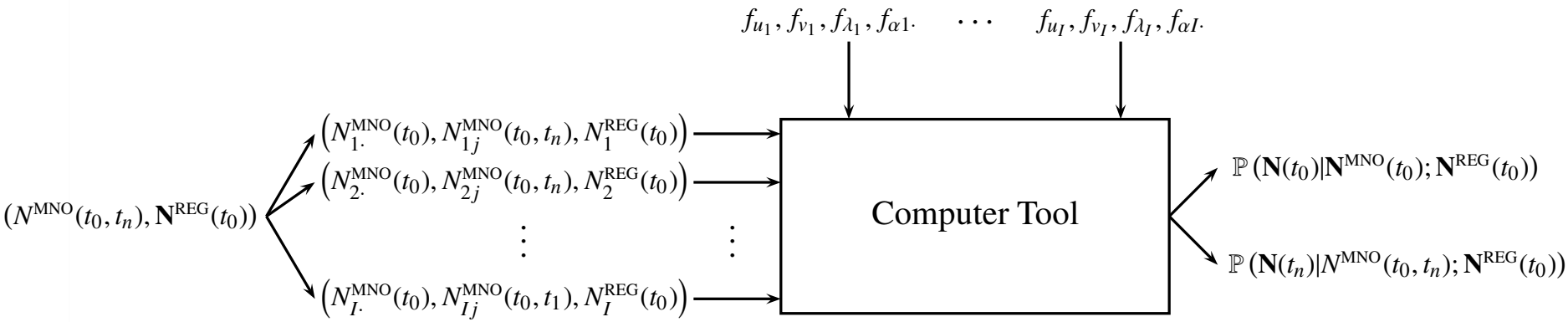
- (•) Probability
- ( ) Signal strength (dB)

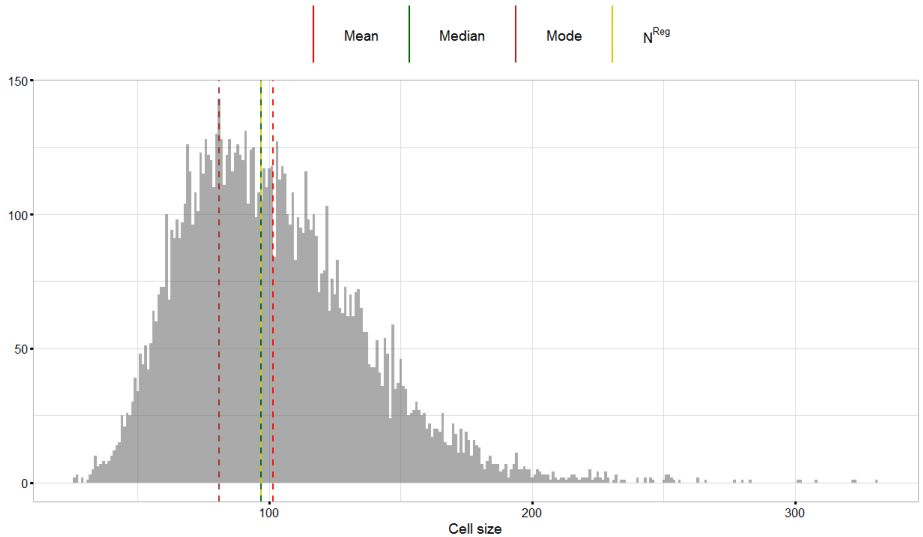
Selected cells

- [x] Cell 1
- [ ] Cell 2
- [ ] Cell 3
- [ ] Cell 4
- [ ] Cell 5
- [ ] Cell 6
- [ ] Cell 7
- [ ] Cell 8
- [ ] Cell 9
- [ ] Cell 10
- [ ] Cell 11
- [ ] Cell 12
- [ ] Cell 13
- [ ] Cell 14



Package `pestim`





Quality issues

- **CoP** affected by two generic facts:
  - MNOs **active part of the production process**.
  - Change of **inferential paradigm**.
  - **Higher** degree of **breakdown**.

- Example: **accuracy** dimension

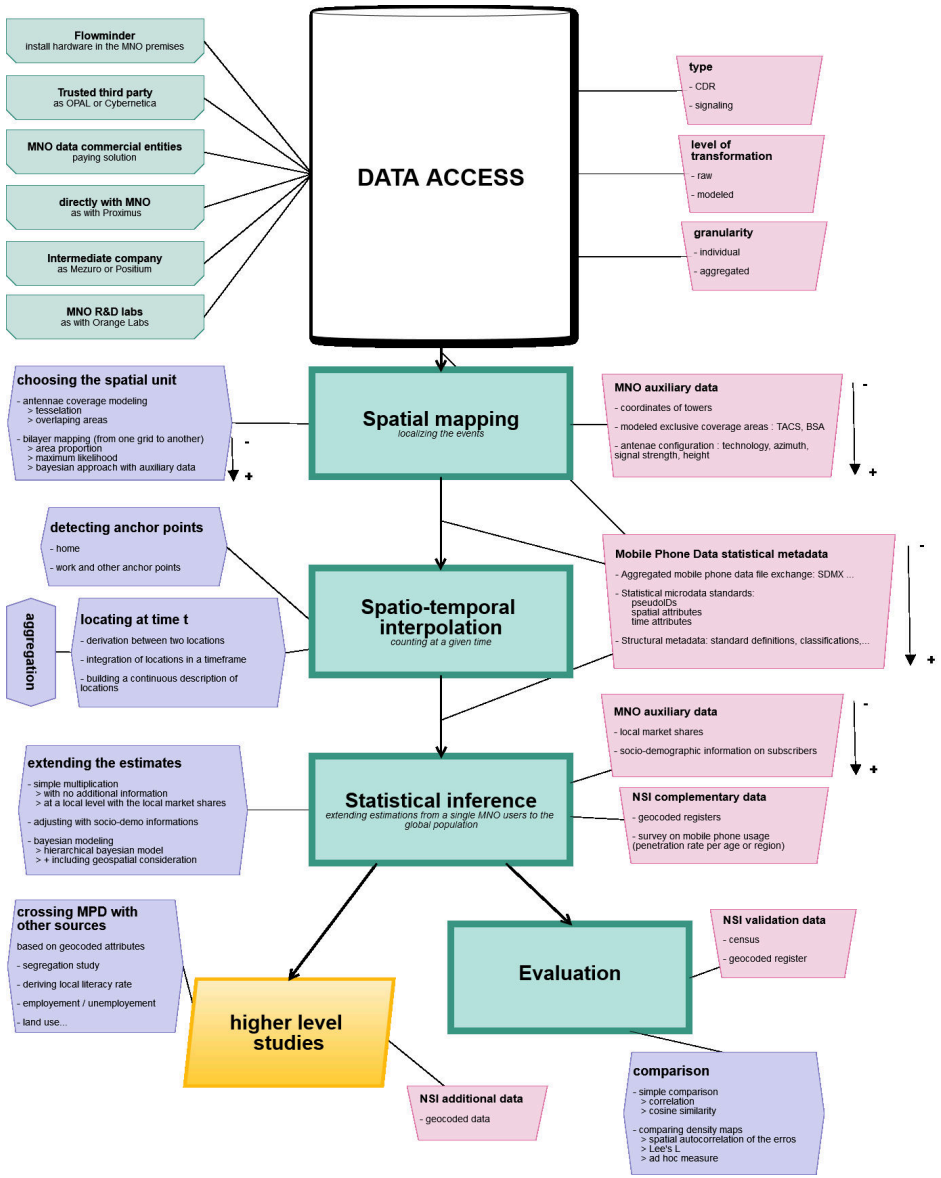
  From **confidence** intervals to **credible** intervals

  Model **checking** and model **assessment**

Main conclusions

- **Access blocked**: further work on **perceived risks** and **collaboration**.
- **Total Survey Error** paradigm still **valid**.
- **Geolocation**.
- **No probability sampling**: hierarchical **models**?
- **Computational complexity** for storing, accessing, and computing **in situ**.
- **Quality Assurance Framework** needs revision: **active role** of data holders and change of **inferential paradigm**.

The future research



The future research