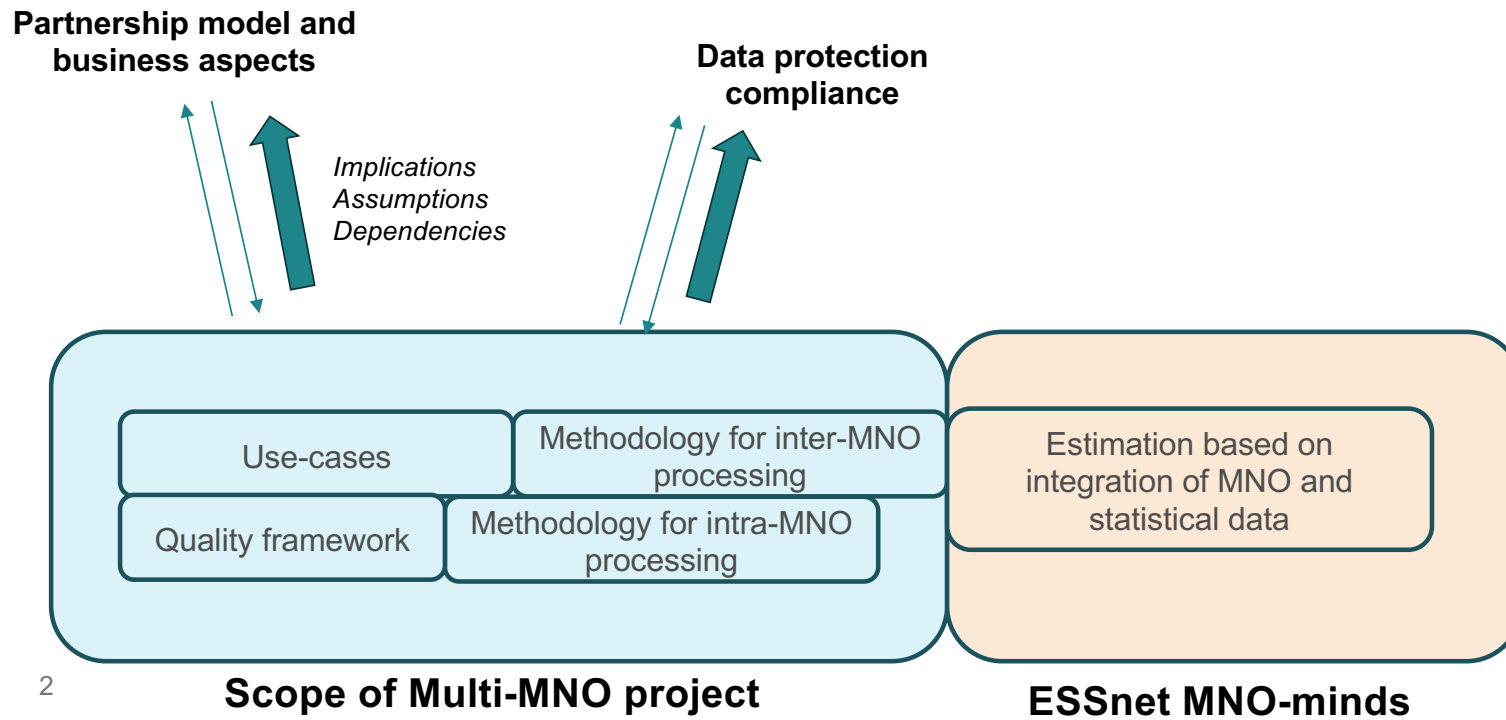Service contract ESTAT 2021.0400 – Multi-MNO project

Feedback to first round of comments by the Advisory Board
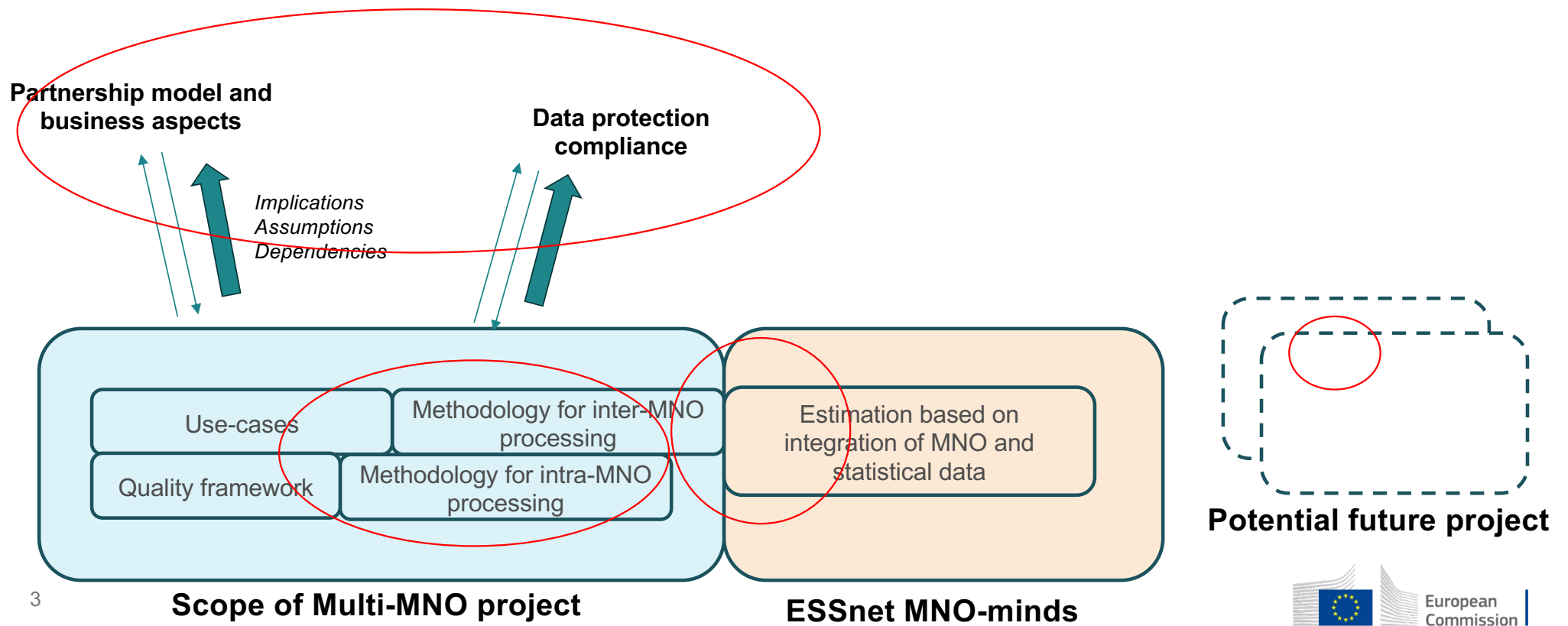
Fabio Ricciato
Eurostat - Unit A5 Methodology; Innovation in Official Statistics

Physical meeting of Multi-MNO Advisory Board - Rome, 6. May 2024
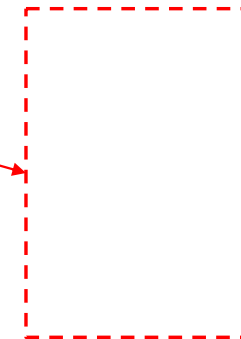
Content and context

Partnership model and business aspects

Data protection compliance

Implications
Assumptions
Dependencies

Use-cases

Methodology for inter-MNO processing

Quality framework

Methodology for intra-MNO processing

Estimation based on integration of MNO and statistical data

Scope of Multi-MNO project

ESSnet MNO-minds

European Commission

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ESSnet MNO-minds

Potential future project

European Commission

3

Content and context

Partnership model and business aspects

Data protection compliance

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Methodology for inter-MNO processing
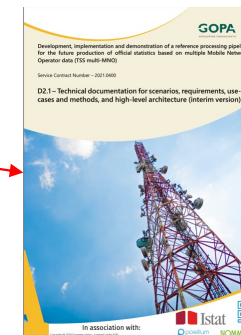
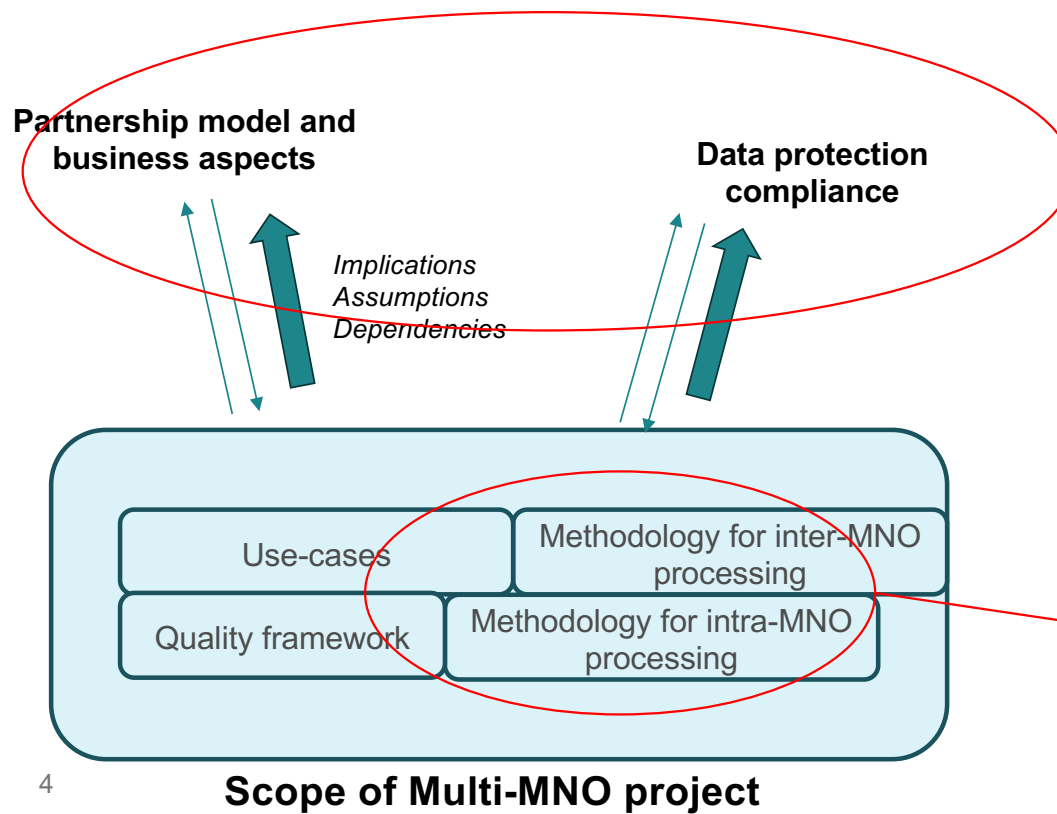Methodology for intra-MNO processing

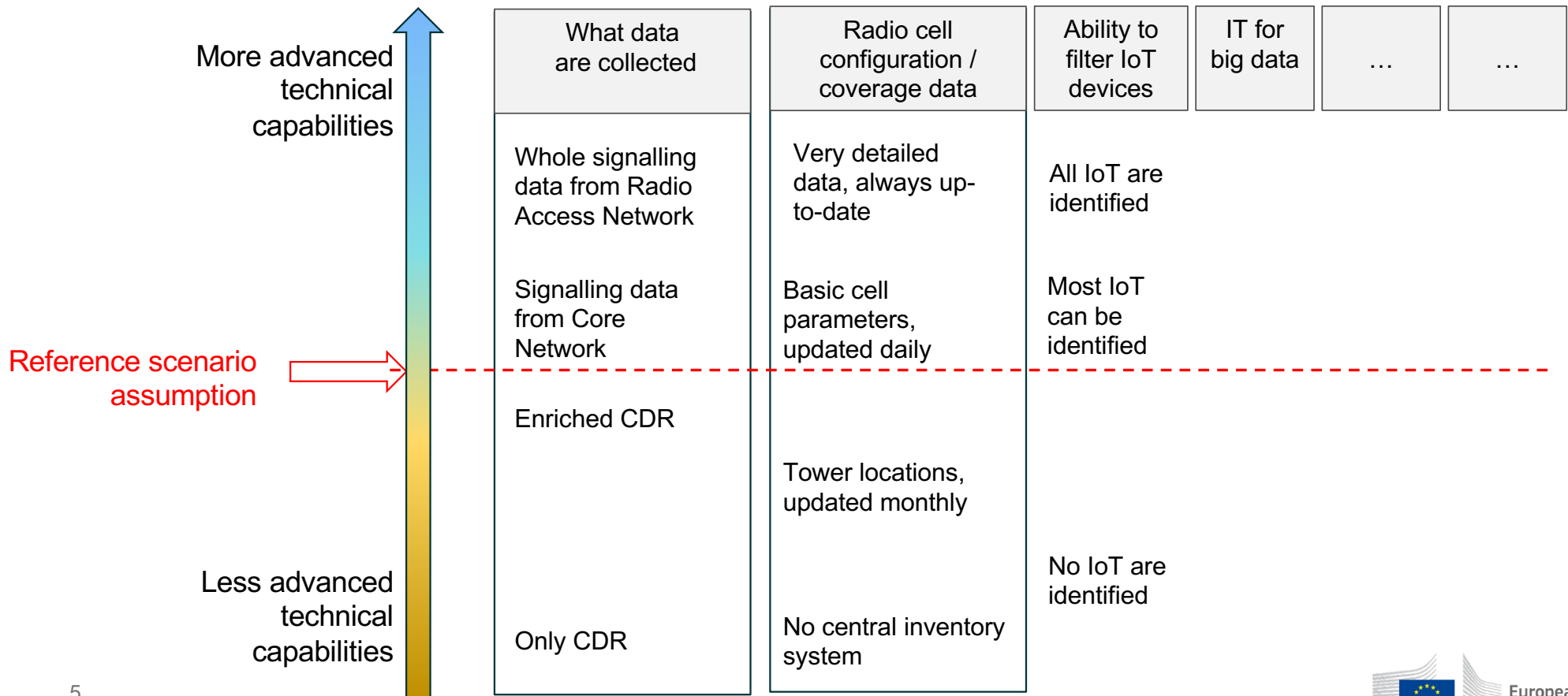**Scope of Multi-MNO project**

TF MNO position paper

New paper or report to be drafted (resp: Eurostat)

Project deliverables (e.g. D2.1, D3.1)

Technical capabilities
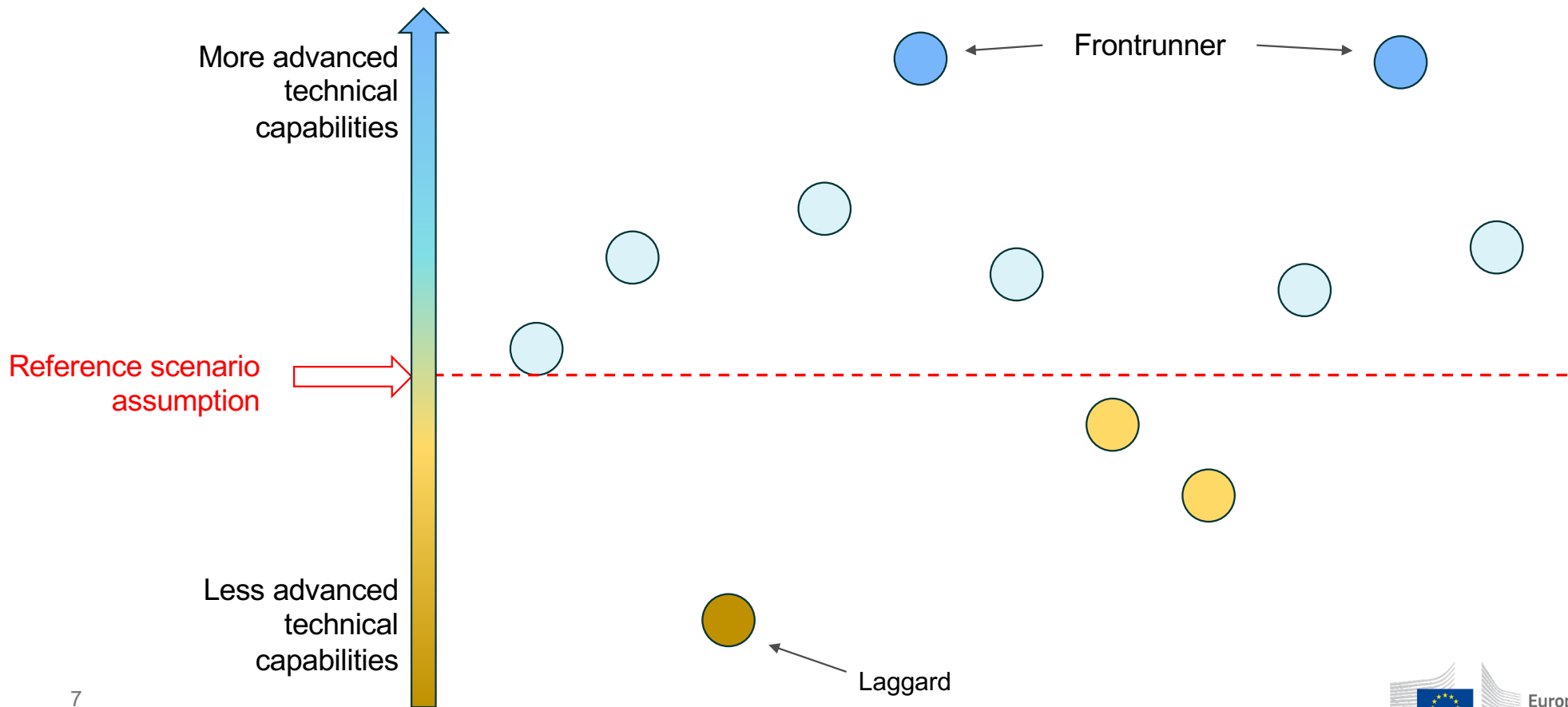
More advanced technical capabilities

Less advanced technical capabilities

Reference scenario assumption

What data are collected	Radio cell configuration / coverage data	Ability to filter IoT devices	IT for big data	…	…
Whole signalling data from Radio Access Network	Very detailed data, always up-to-date	All IoT are identified			
Signalling data from Core Network	Basic cell parameters, updated daily	Most IoT can be identified			
Enriched CDR					
	Tower locations, updated monthly	No IoT are identified			
Only CDR	No central inventory system				

European Commission

Heterogeneous technical capabilities (at present)

More advanced technical capabilities

Less advanced technical capabilities

Reference scenario assumption

Frontrunner

Laggard

European Commission

Heterogeneous technical capabilities (at present)

More advanced technical capabilities

Reference scenario assumption

Less advanced technical capabilities

Frontrunner

Laggard

7

NSI-MNO partnership and business model

- Financial compensation for MNO? In what form, how much, by whom…?
- Are new investment needed to comply with NSI requests? How to incentivise continuous improvements?
- What financial terms are "fair" given heterogeneity of MNO technical capabilities and past investments?

  - **Not a task of this project to provide answers**, but …

  - … the **project results enable and provide a base for starting the discussion …** (to be conducted in other parallel and future activities)

  - … insofar the <u>methodology and quality</u> framework developed in the project represent a concrete and detailed specification of what exactly is requested/expected by MNOs (without that, the discussion on financial aspects could not even start)

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Definition of statistical indicators

- Official Statistics vs. commercial statistics

  - The publication of official statistics will "compete" with commercial statistis in the same domain? Or rather reinforce the market demand thereof as in freemium(*) model?

  - Answer depends on the specification of official statistics indicators

- Related issue: EU vs national specifications

  - EU-level specifications are **prescriptive** or **inspirational?**

  - Are statistical indicators to be defined «strongly» at ESS level, with some customisation at national level, or to be defined mostly at national level, based on generic ESS templates

- *Points for discussion within the TF MNO*
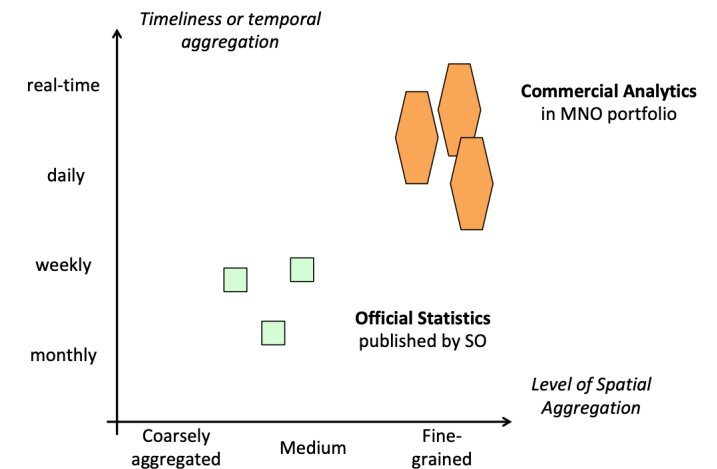
(*) see:DGINS 2018 paper Processing of Mobile Network Operator data for Official Statistics: the case for public-private partnerships https://zenodo.org/records/10246468

Pipeline governance

- How to maintain the methodological pipeline?

- There will be proposals for improving/changing/adding parts of the pipeline (methods, use-cases, etc.)

- Who decides which proposals are onboarded in (the next version of) the methodological pipelins? Based on what criteria?

  - E.g. dedicated ESS committee / TF MNO?

- *Point for discussion within the TF MNO*
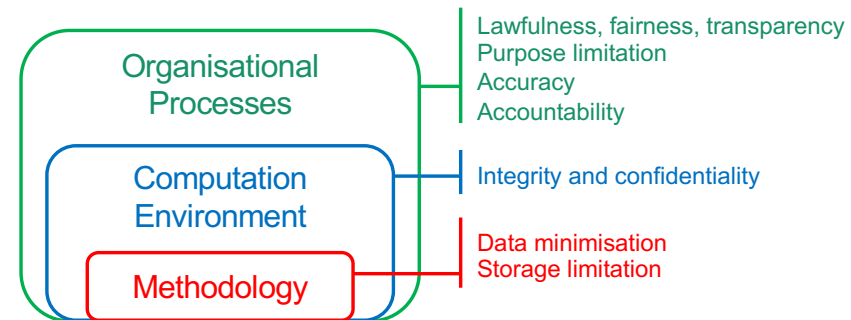
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Data protection

- Current practice very heterogeneous across MNOs
  - Persistence of individual pseudonyms: 24 hours, 1 day, 3 months, several years …
  - Suppression of small aggregate values based on k-anonymity: different values of k, different points of application along the workflow, …

- Establishing a common methodology enables **establishing a common set of data protection measures**, consistent with the proposed methodology.
  - Distinguish measures at **processing** stage (data protection engineering) and Statistical Disclosure Control (SDC) before **dissemination**
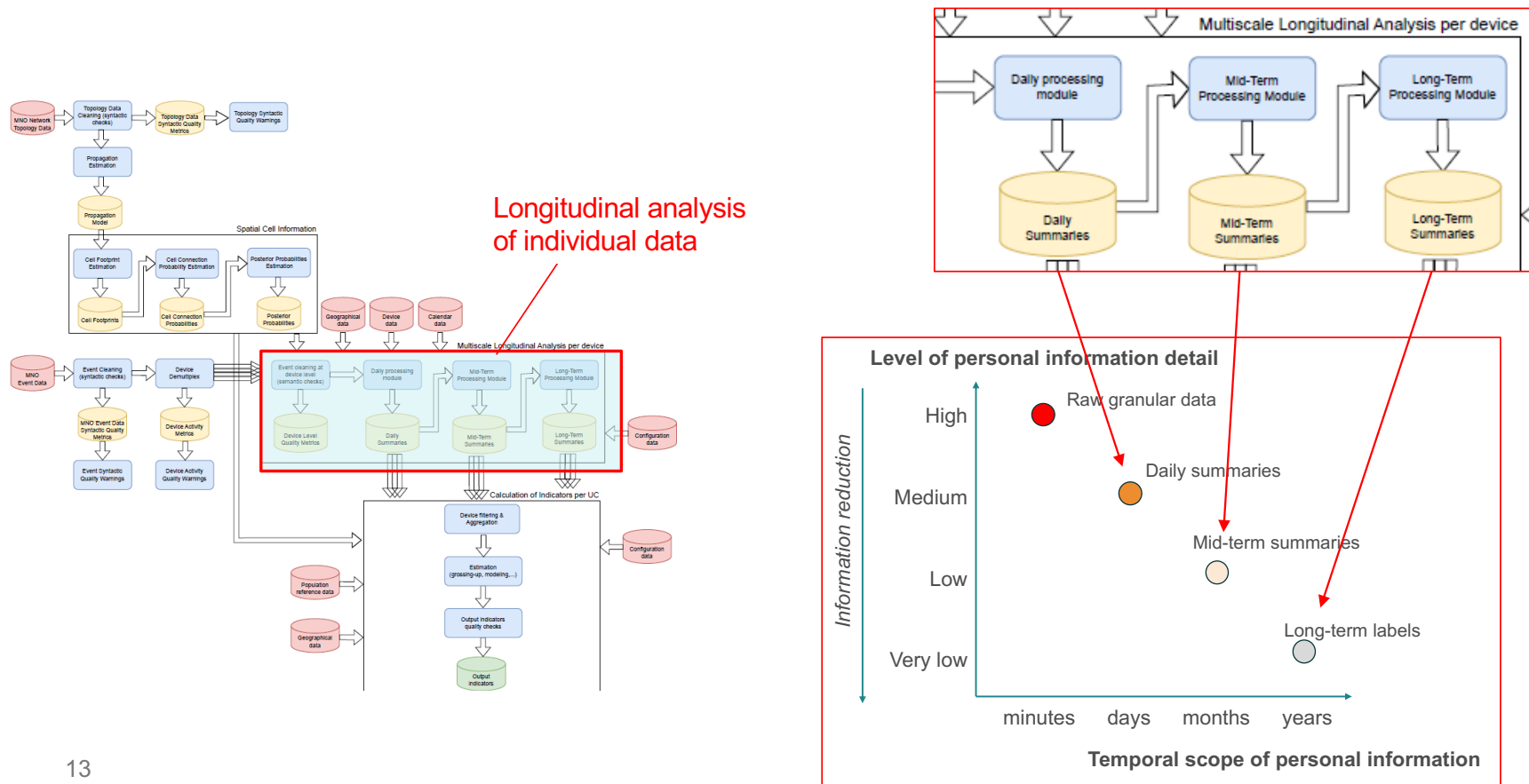
Data protection
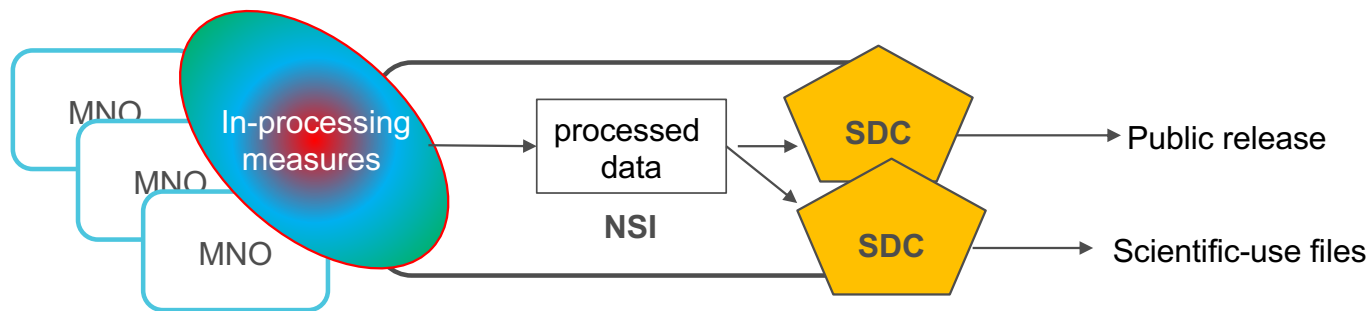
In-processing measures
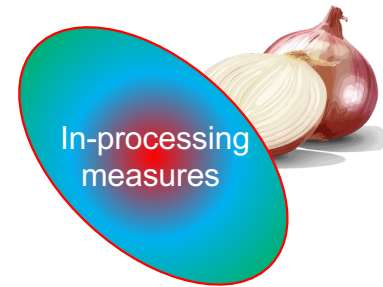
- SDC methods on final indicators: not in the project scope

- In-processing data protection measures: onion-layered approach

  - Organisational environment

  - Computation environment

  - Methodology

Organisational Processes — Lawfulness, fairness, transparency
Purpose limitation
Accuracy
Accountability

Computation Environment — Integrity and confidentiality

Methodology — Data minimisation
Storage limitation

- Natural mapping of GDPR principles to each layer
- Methodology layer is (the only one) in the project scope

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Data minimisation & Storage minimisation by [methodological] design

Longitudinal analysis of individual data

Data protection: supplementary measures

- Data minimisation and Storage minimisation *by methodological design* within longitudinal analysis module

- Individual data remain inside safe computation environment at MNO premise
  - *If* micro-data linkage will be needed for some use-cases, it should be implemented with support of strong Privacy-Enhancing Technologies (PET)

- Further supplementary Technical and Organisational Measures (TOM) may be added, preferably defined at EU level
  - *Short-term pseudonymisation (for commercial purposes) can be reconciled with long-term integration (exclusively for official statistics purpose) via PET(*)*

(*) see e.g. Eurostat project https://cros.ec.europa.eu/estat-2019-0232

- Specification of (proposed) methodological workflow
  enables discussion with EU data protection authorities

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Inter-MNO fusion 1/2

Intra-MNO processing (focus of D2.1) vs Inter-MNO fusion (added in D2.2)

Main issues for inter-MNOs fusions:

1. Domestic indicators: combination of aggregate data (from intra-MNO processing) across multiple MNOs <u>in the same country</u>.

   - Issue: double-counting of people with multiple devices
   - Mitigation: correction factors in estimation stage ($\rightarrow$ MNO-MINDS)
   - *De-duplication based on joint processing of micro-data (long-term similarity of trajectories indicate same perso) excluded due to personal data protection, could be considered as option for future extension in combination with advanced PET solution*

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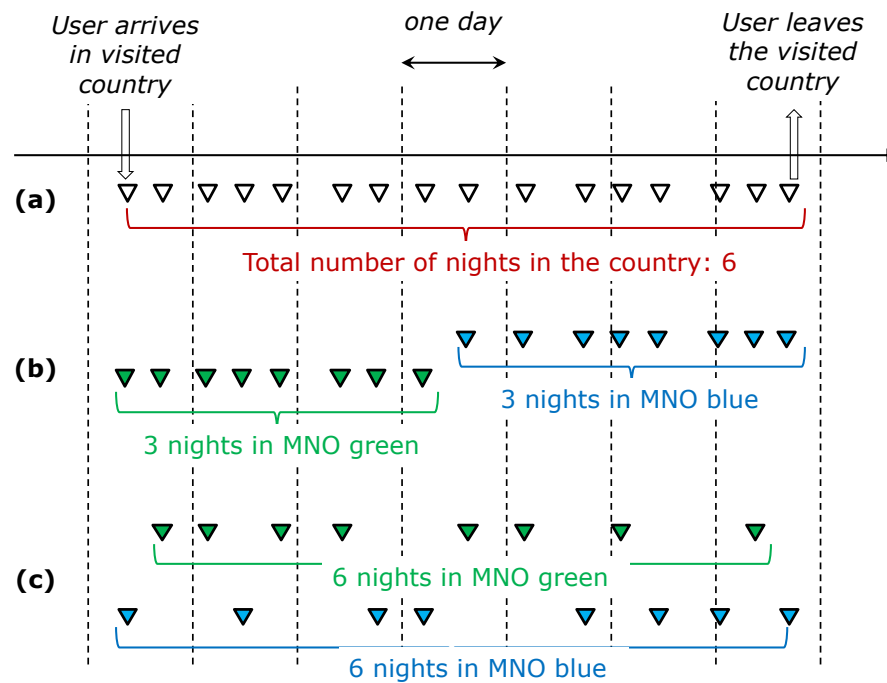
Inter-MNO fusion 2/2

Main issues for inter-MNOs fusions:

2. Cross-roaming abroad: mobile device homed in country X may be roaming across multiple MNOs in visited country Y

   - Issue: the individual "trajectory" is split across multiple visited MNO introduces noise in the indicators computed based on partial views

   - **Approach A: fusion of micro-data** for inbound roamers across visited MNOS (with PET), then joint processing

   - **Approach B. combination of aggregate data** obtained from intra-MNO processing based on partial views

   - A vs B: trade-off between accuracy and data protection burden

   - Accuracy gain/loss depends on specific indicator → **ongoing empirical analysis**

Example

- Target indicator: number of people spending at least 4 nigths abroad

(a) Joint view (micro-data fusion): this user contributes +1

Total number of nights in the country: 6

(b) Sum of partial views: this user contributes 0 (under-estimation)

3 nights in MNO blue
3 nights in MNO green

(c) Sum of partial views: this user contributes +2 (over-estimation)

6 nights in MNO green
6 nights in MNO blue

Inter-MNO fusion: issues *not* considered in the current project

Not considered:

- Domestic roaming (we assume it can be neglected)
- Mirror statistics – not really a "fusion" but merely a comparison of indicators
- Fusion of micro-data from Home MNO and Visited MNOs to gain better spatial resolution – left for future follow-up project
  - Example: instead of e.g.
    "# of Germans visiting **Tolouse**" (Visited MNO view, inbound)
    or "# of **Berlin** residents visiting France" (Home MNO view, outbound)
    to "# of **Berlin** residents visiting **Tolouse**" (merged view)

European Commission

Thank you

European Commission