



Mobility data to inform the COVID-19 crisis response at EU scale

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*Michele Vespe – Stefano M. Iacus
Joint Research Centre – Ispra (VA), Italy*

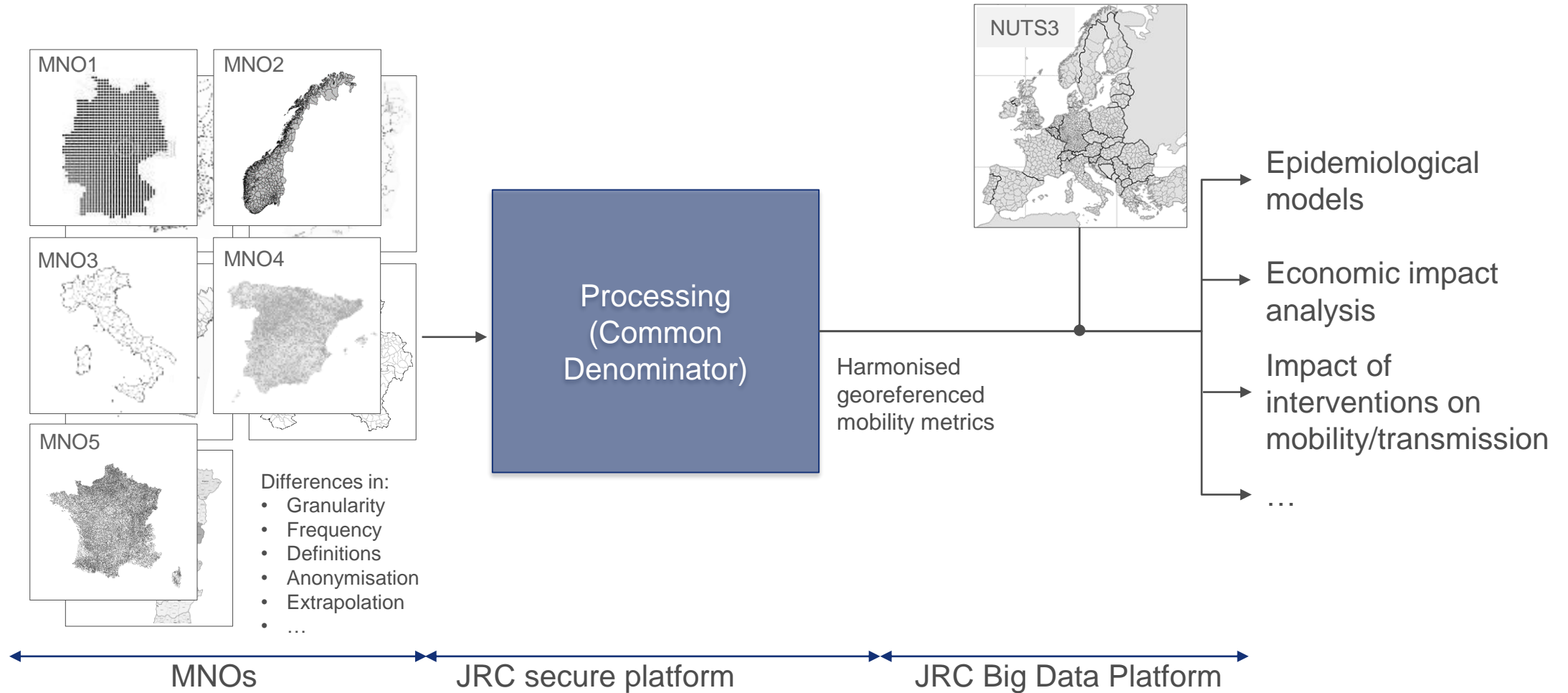
B2G framework

- Unprecedented example of **B2G cooperation**, that helped **inform COVID-19 crisis response**
- The data enabled the Commission to **understand and predict the spread of the disease**, the **effectiveness** of the **containment measures**, their **socio-economic impacts** and **design scenarios** at **EU scale** with comparable measures
- **17 Mobile Network Operators (MNOs)** data covering **22 MSs + Norway**

Data processing Measures

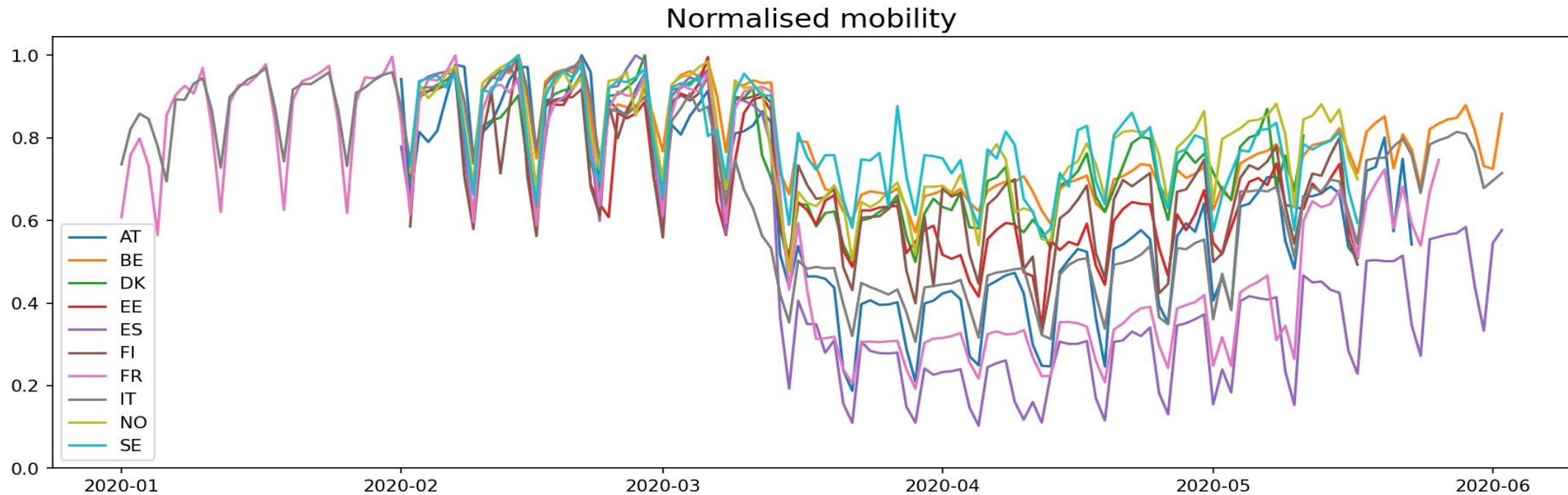
- Safeguards include:
 - **clear description and limitation** of the **purpose** for which the **data is being used**;
 - **protecting** the legitimate **commercial interests of the MNOs** by **granting limited access** to the data **only to** a few researchers at **the JRC**;
 - non-disclosure to third parties;
 - **data retention measures** and **hosting** on a **secure** dedicated platform.

Mobile Positioning Data – JRC access model



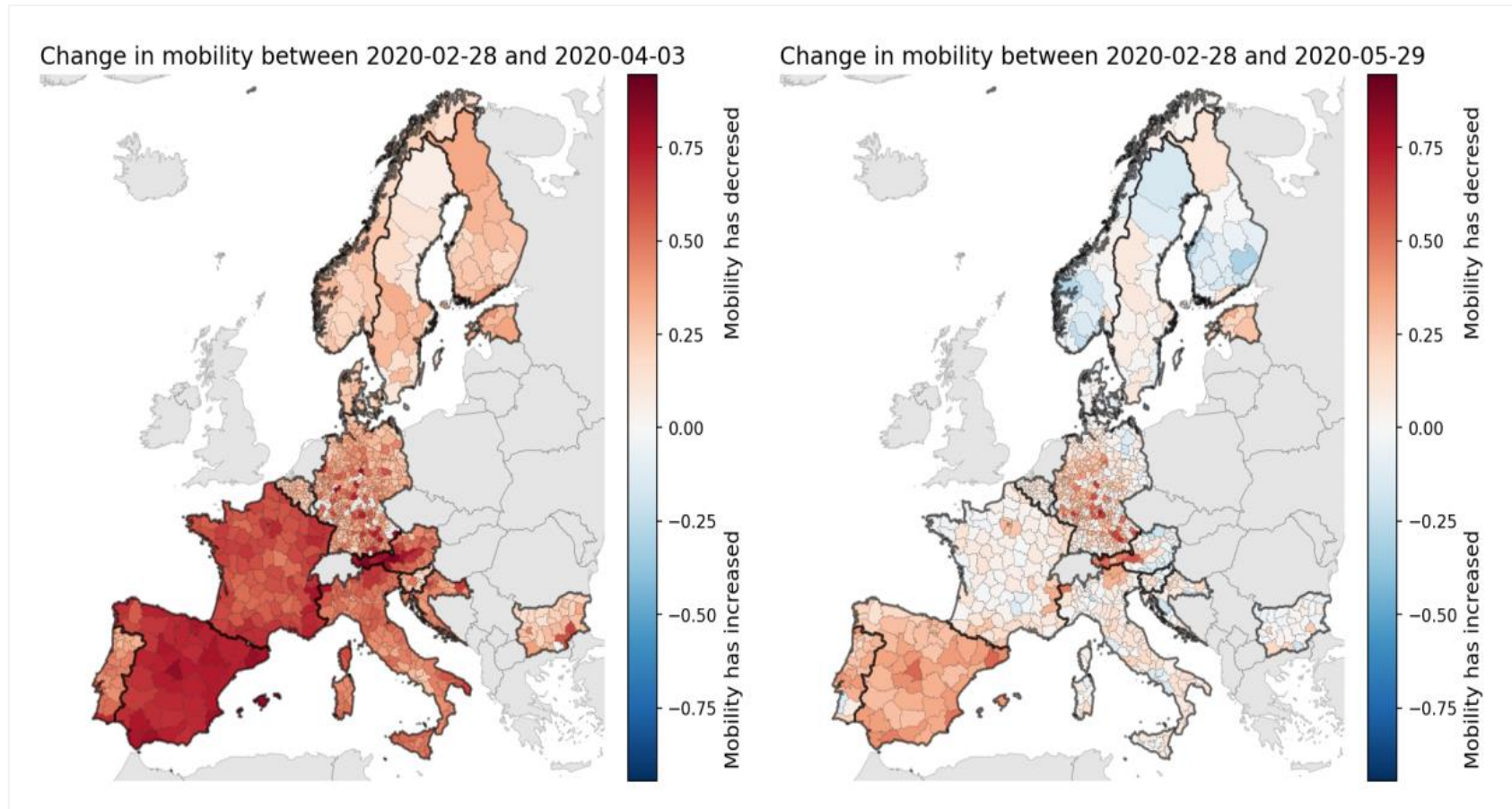
Product I – Mobility Indicators

Historical time series of movements, aggregated in terms of direction (inward, outward and internal) and in space **normalized at NUTS3 level**. The indicator is computed on a daily basis, and is normalised to a reference day of the historical data received for the NUTS3 reference area under consideration.



[REF] Santamaria, Carlos, Francesco Sermi, Spyros Spyrtatos, Stefano Maria Iacus, Alessandro Annunziato, Dario Tarchi, and Michele Vespe. "Measuring the impact of COVID-19 confinement measures on human mobility using mobile positioning data. A European regional analysis." *Safety Science* (2020), Vol 132, <https://doi.org/10.1016/j.ssci.2020.104925>

Common denominator (NUTS3)

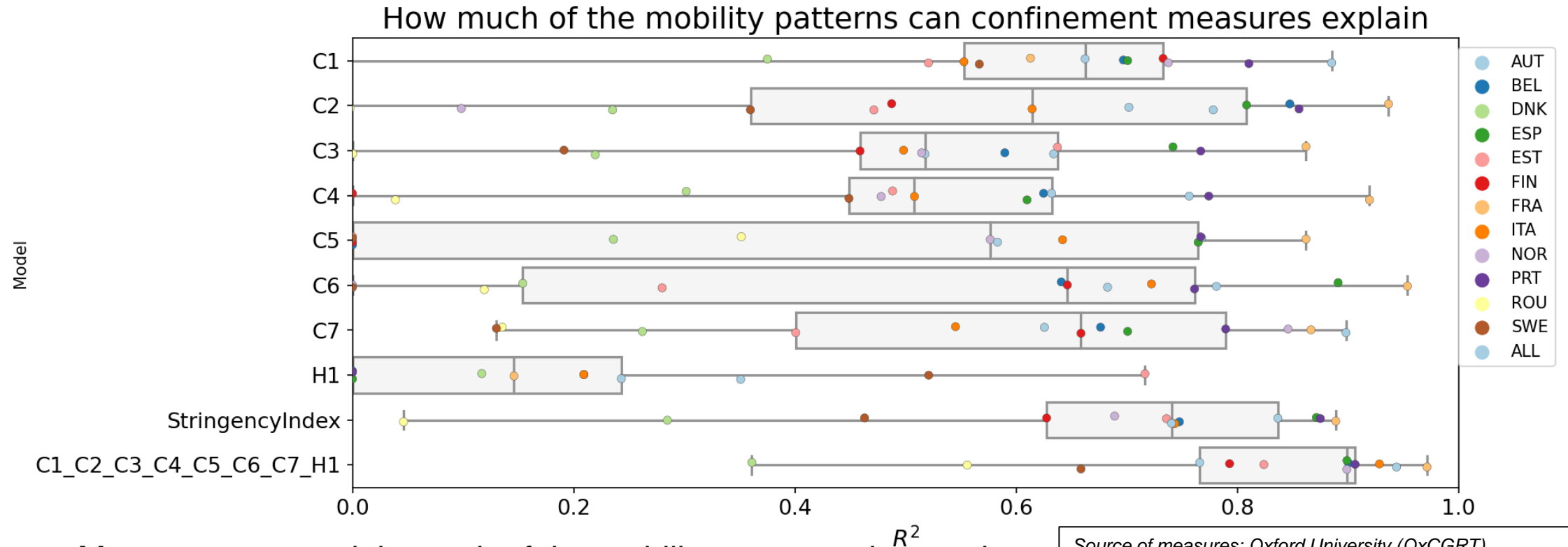


MNO capture mobility using slightly **different definitions** and at variable granularities and refresh rates

Harmonisation process led to a **comparable** indicator of the reduction of mobility at **NUTS3** level

This represents a first instance of a **common denominator** among multiple data providers

Confinement measures and mobility



- Measures can explain much of the mobility patterns observed
- In some countries more than in others
- Information campaigns (H1) can explain less than closures/bans

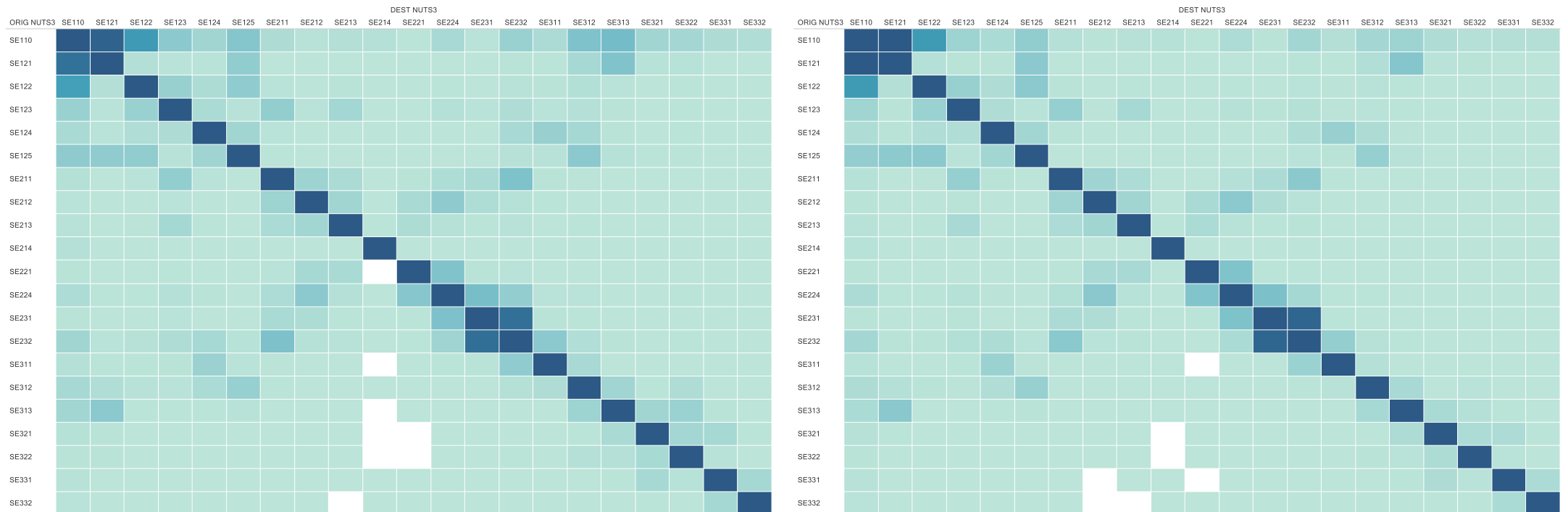
Source of measures: Oxford University (OxCGRT)

C1 - closures of schools and universities
 C2 - closures of workplaces
 C3 - cancelling of public events
 C4 - restrictions on gatherings
 C5 - closures of public transport
 C6 - stay at home requirements
 C7 - restrictions on internal movement between cities/regions
 H1 - public information campaigns
 StringencyIndex - composite indicator (C1-7 + H1 + C8: restrictions on international travel)

[REF] Santamaria, Carlos, Francesco Sermi, Spyros Spyratos, Stefano Maria Iacus, Alessandro Annunziato, Dario Tarchi, and Michele Vespe. "Measuring the impact of COVID-19 confinement measures on human mobility using mobile positioning data. A European regional analysis." *Safety Science* (2020), Vol 132, <https://doi.org/10.1016/j.ssci.2020.104925>

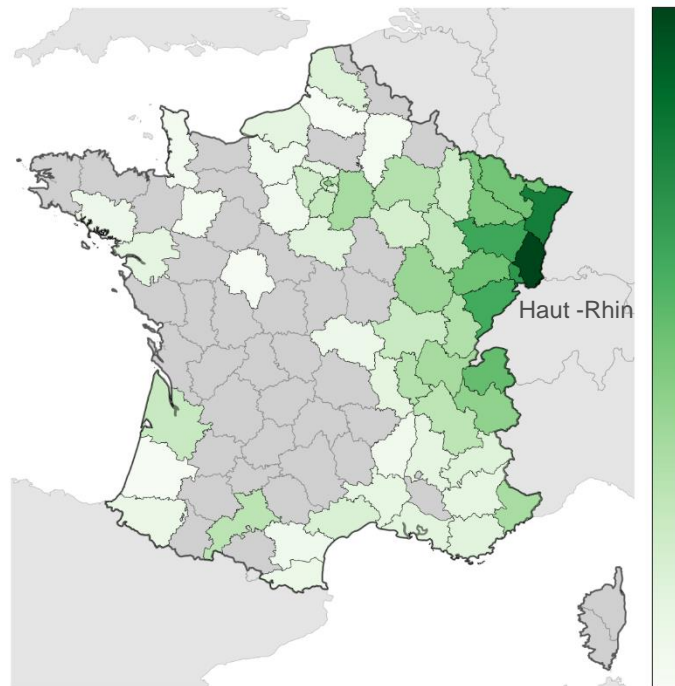
Product II – Connectivity Matrices

Origin-destination matrices at NUTS3 level and averaged in time. The matrices are computed on a weekly basis, and normalised to a specific country reference week

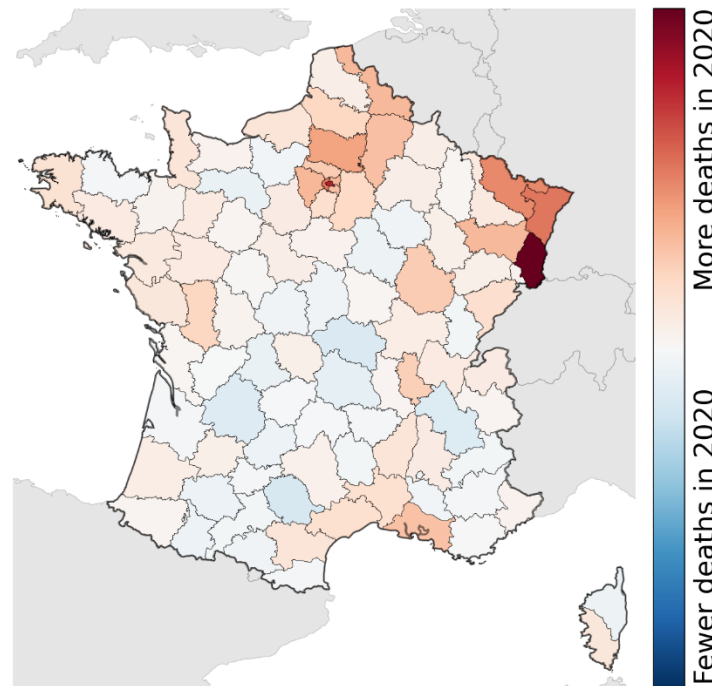


[REF] Iacus, Stefano Maria, Carlos Santamaria, Francesco Sermi, Spyros Spyros, Dario Tarchi, and Michele Vespe. "Human mobility and COVID-19 initial dynamics." *Nonlinear Dynamics* (2020), DOI <https://doi.org/10.1007/s11071-020-05854-6>

Haut-Rhin (FR) case study (but also IT and ES)



Connectivity levels from Haut-Rhin during the week of 23-29 Feb 2020



Cumulative excess of deaths 25 March 2020 vs 2019

importance of mobility data in understanding the initial spread dynamics

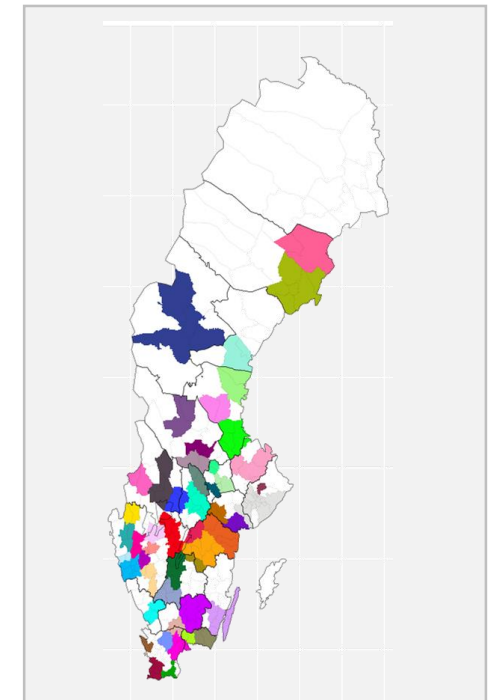
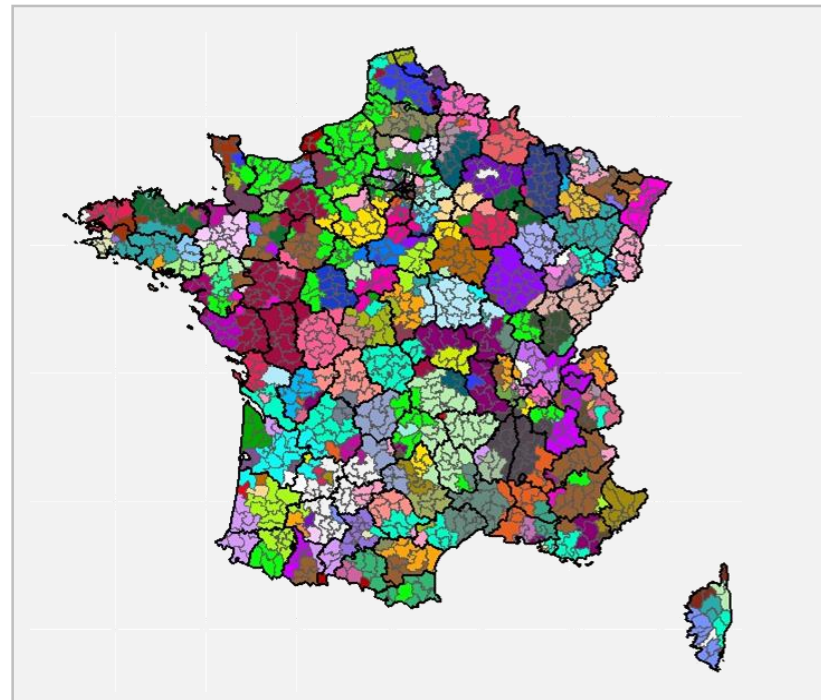
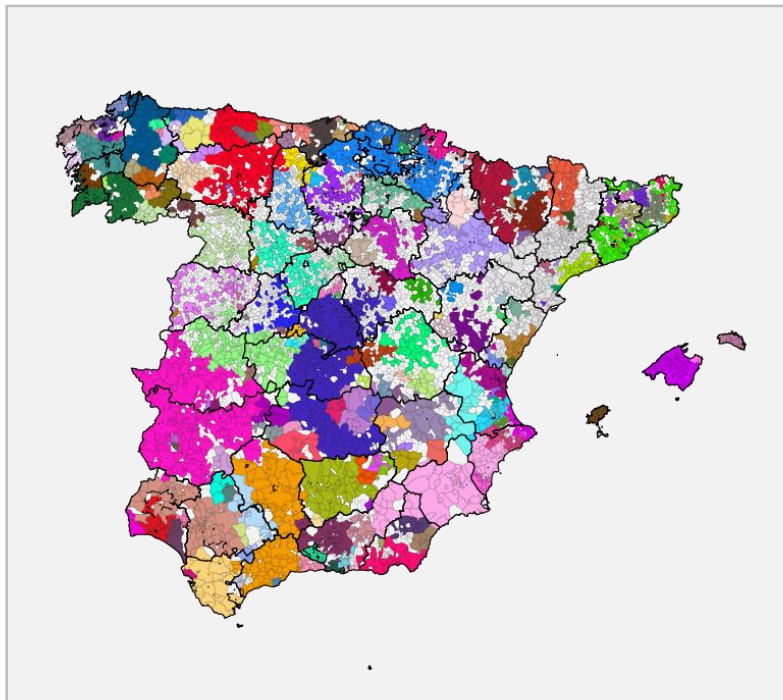
mobility alone can explain up to 90% of observed excess cumulative deaths

typical lagged effect of human mobility on excess deaths is of about 14 days

when containment measures are in place, the impact of mobility reduces

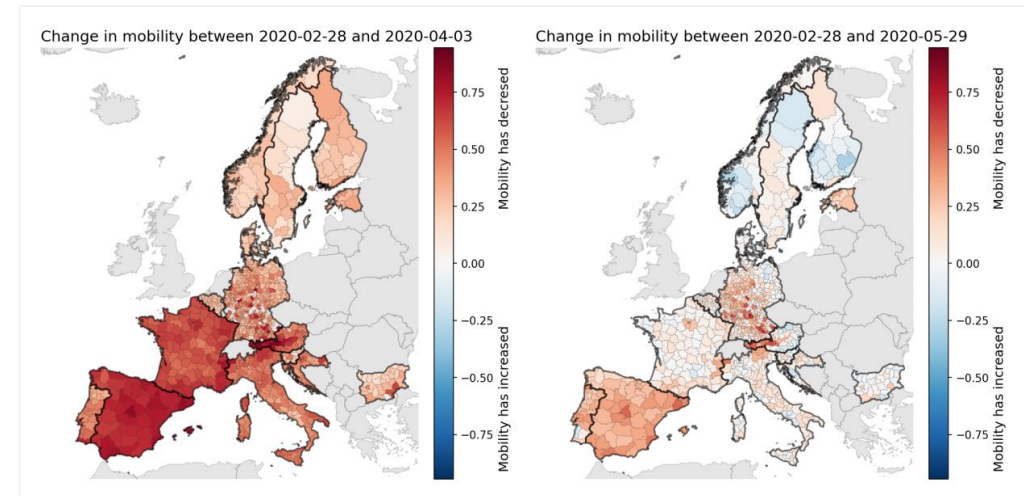
Product III – Mobility Functional Areas

This product is a set of territorial units resulting from the organisation of mobility patterns. The boundaries of MFAs do not reflect geographical particularities or historical events or administrative constraints.



Three outputs and communications

- European Commission daily news 15/07/2020
https://ec.europa.eu/commission/presscorner/detail/en/mex_20_1359
- DG CONNECT Communications
<https://ec.europa.eu/digital-single-market/en/news/coronavirus-mobility-data-provides-insights-virus-spread-and-containment-help-inform-future>
- JRC Web Headline
<https://ec.europa.eu/jrc/en/news/coronavirus-mobility-data-provides-insights-virus-spread-and-containment-help-inform-future>
- Main messages:
 - added value (EU scale, B2G, data4policy)
 - mobility matters
 - effectiveness of containment measures
 - informing policy to minimise socio-economic impact
 - Technical reports based on products: #1 Mobility Indicators, # Connectivity matrices, # Mobility Functional Areas



Input to Modelling

- Impact of mobility on R
- Meta-population epidemiological modelling
- Nowcasting/forecasting of economic variables
- Behavioural models for contact modelling to support COVID-19 exit strategies
- Understanding different reaction times to mobility restrictions and whether the mobility reductions are uniformly distributed
- Link between mortality, demographics and mobility to understand the dynamics of the epidemics
- Internal EU borders and flows analysis

Thank you