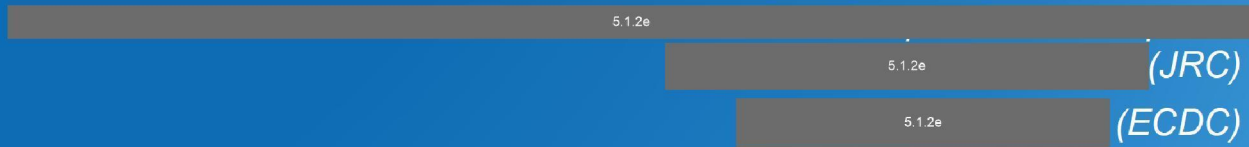




Scenarios and tools for locally targeted COVID-19 Non Pharmaceutical Intervention Measures



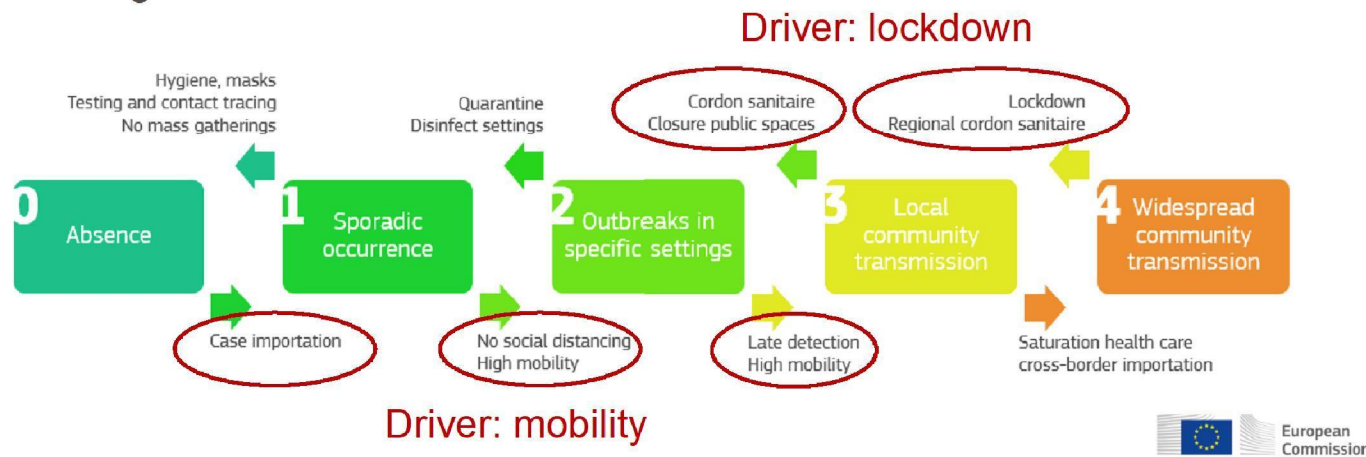
Health Security Committee, 7/12/2020

Objectives

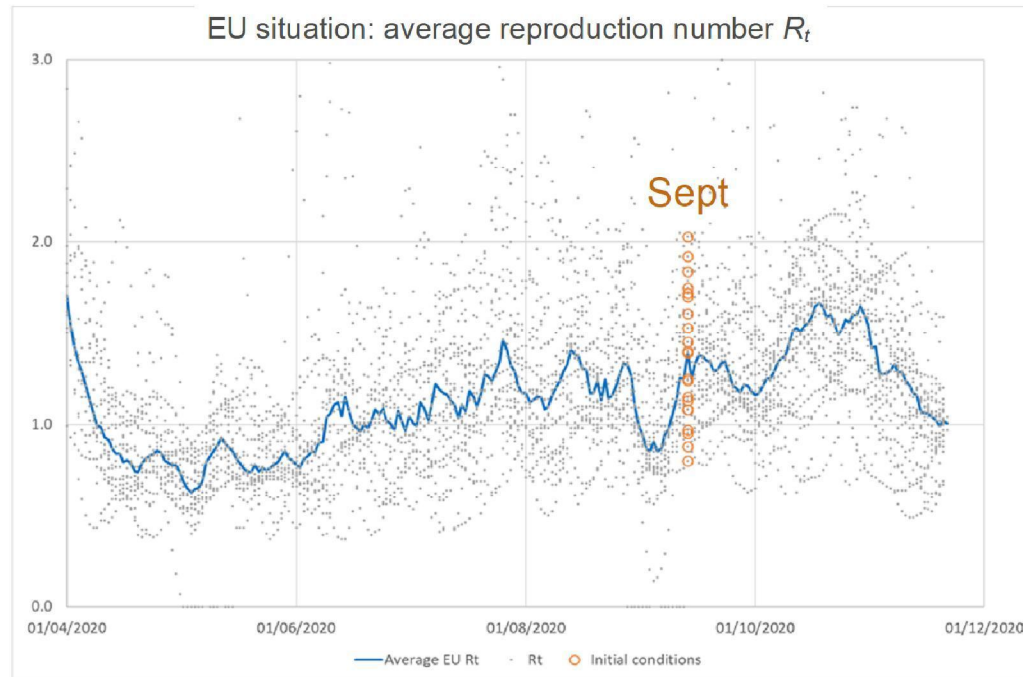
- Describe COVID-19 **epidemiological phases** that will be used to define initial conditions for intervention's scenario using mathematical modelling;
- **Discuss health and socio-economic trade-offs of NPIs:**
 - Stay-at-home recommendations ("lockdown") at regional level: national versus regional action, thresholds for action (timing, intensity, duration, synchronicity)
 - Commuting restrictions: relative effectiveness of mobility and/or transmission rate policies, mix of policies for regions neighbouring a high transmission region.
- Present tools for **monitoring immediate impact of NPIs** based on mobile network operator data

Common terminology and framework

- Five Epidemiological phases + drivers for transition
- Study: 150 days starting from situation in September + arbitrary policy changes

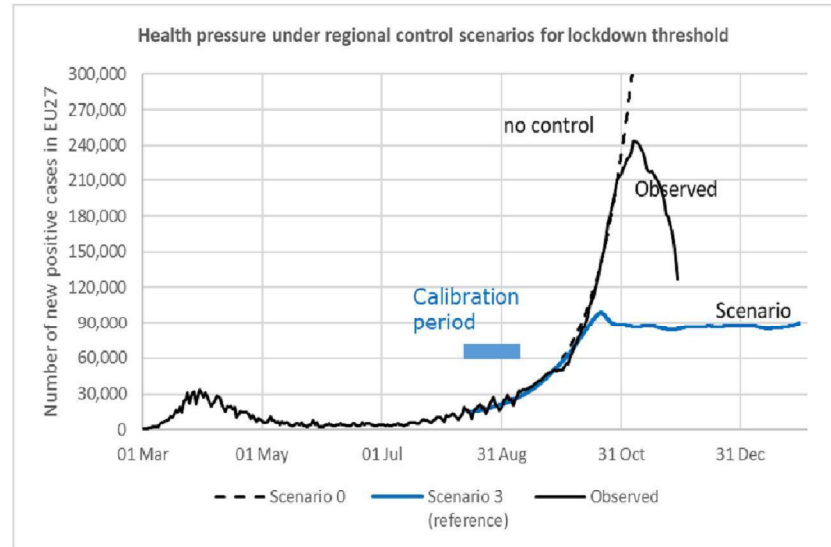


Scenarios: control of transmission and mobility from September



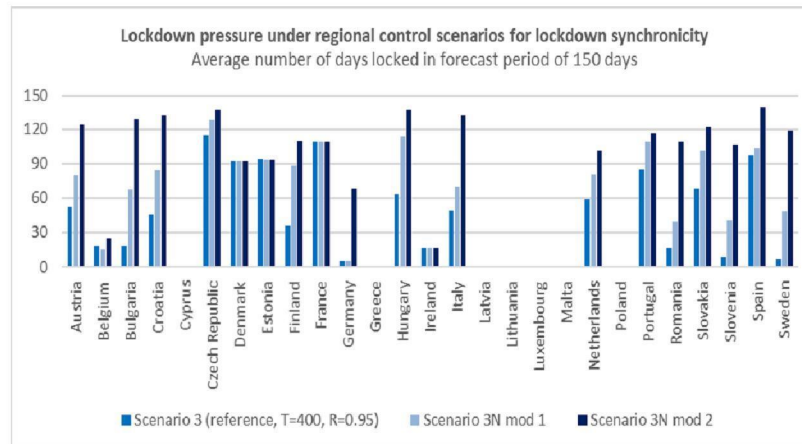
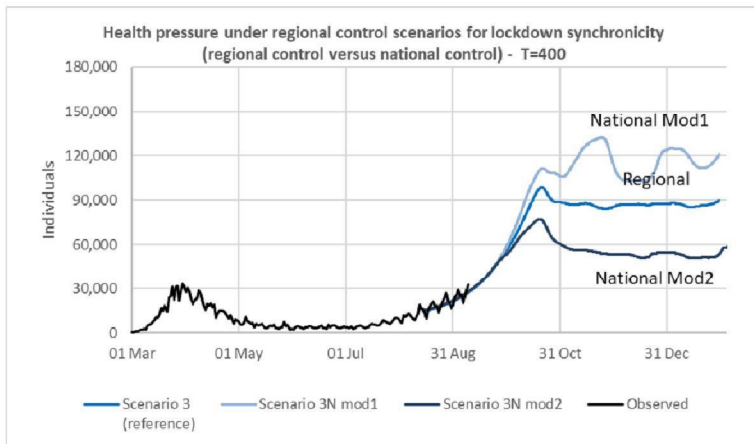
SIR model, key parameter R_t

- **Calibration:** each region separate, last month of data
- Scenario control R_t
 - Target $R_t = [0.7, 0.95]$
- Trigger I
 - new cases per 100000 in 14 days: [20, 100, 400]



Model outputs

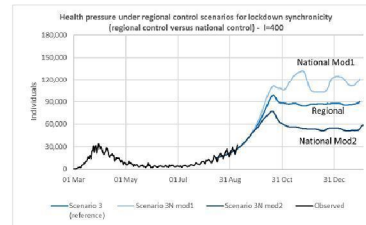
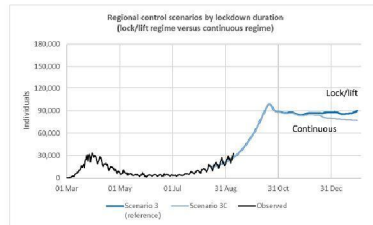
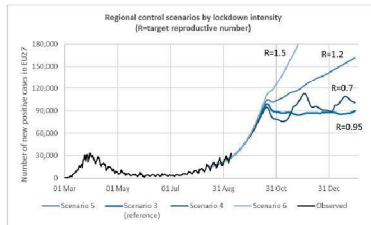
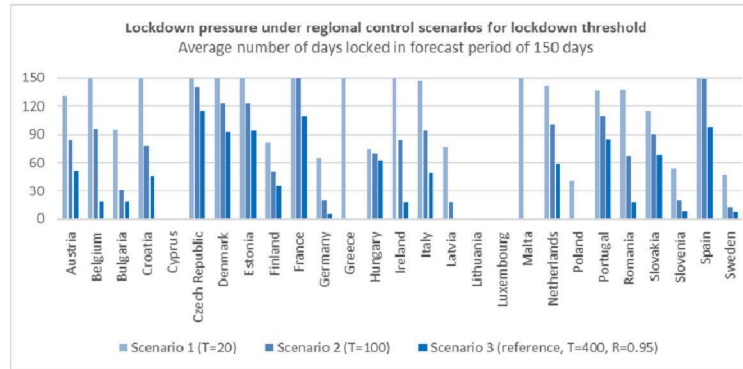
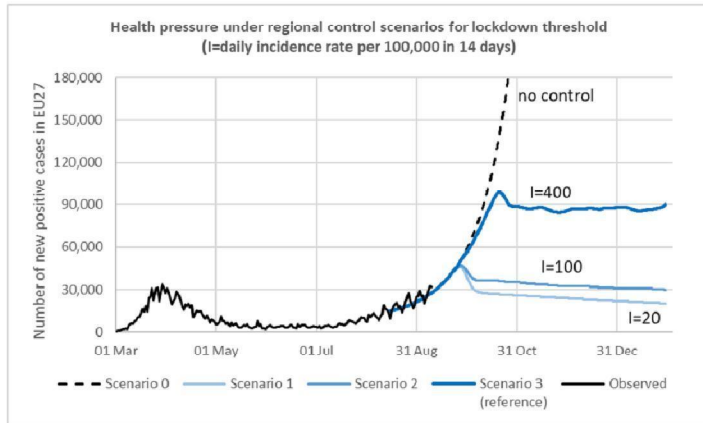
- **Health pressure** = Number of new daily cases, total EU
- **Lockdown pressure** = Number of days citizens experience lockdown



Trade-off health pressure and lockdown pressure

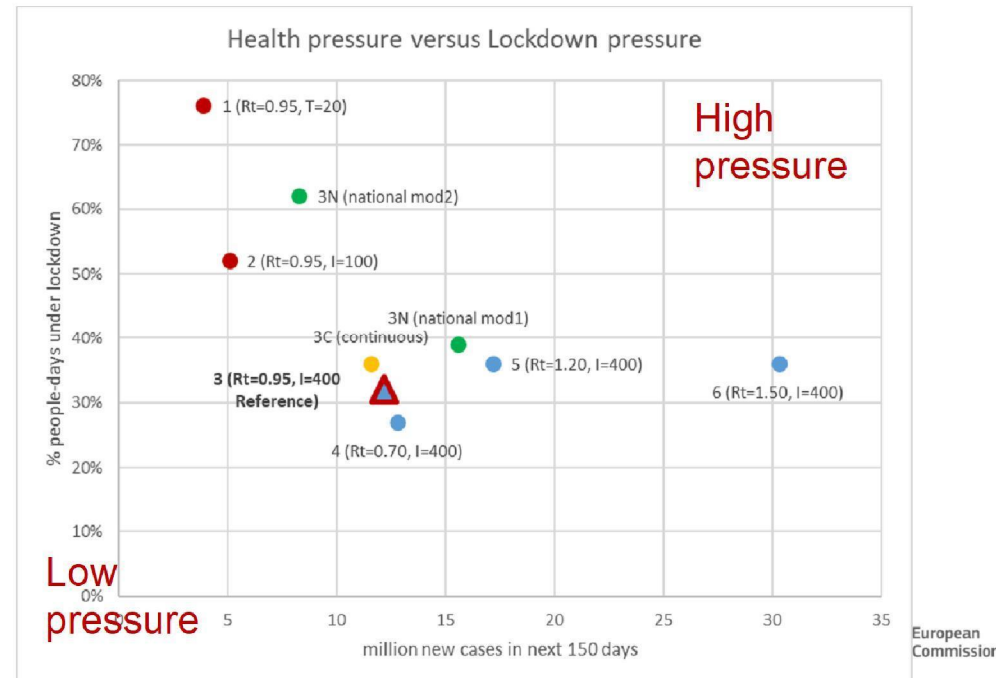
Scenario	Incidence rate threshold I	Target R_t level	Public health pressure	Maximum new daily cases	Lockdown pressure
	<i>New cases per 100,000 in 14 days</i>	<i>No unit</i>	<i>Total new positive cases after 5 months, in million</i>	<i>Million per day</i>	<i>Percentage of days under lockdown in next 5 months</i>
0	No control	-	96.1	1.20	0%
1	20	0.95	3.9	0.05	76%
2	100	0.95	5.1	0.05	52%
3 reference	400	0.95	12.2	0.10	32%

Control of community transmission at regional level: intensity, timing and duration of lockdowns

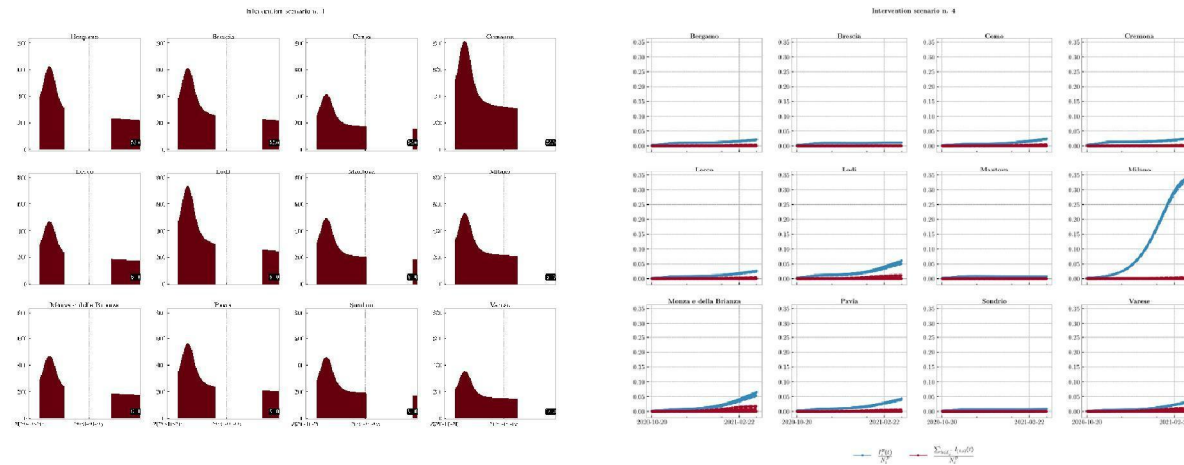


Control of community transmission at regional level: intensity, timing and duration of lockdowns

- Trade-offs exist
- Reference case
 - T=400
 - R=0.95
 - Regional control



Control of inter-regional mobility: the case of commuting

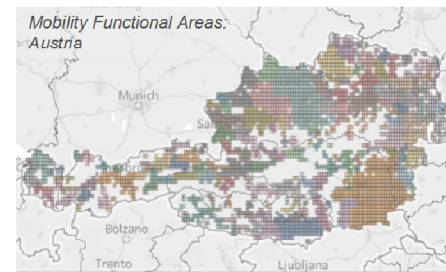
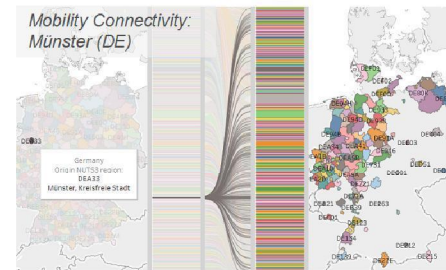
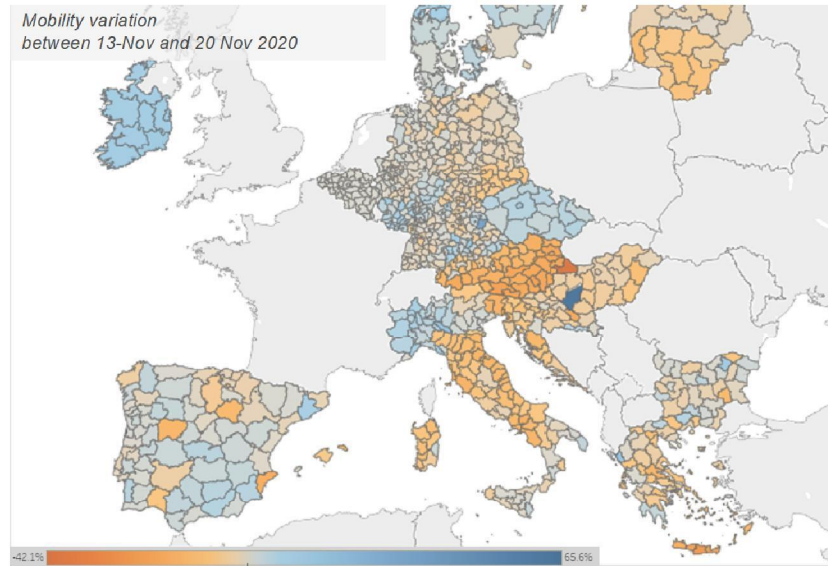


Province level transmission control

Explicit role of cross-region mobility

“Consequently, a balanced mix of transmission rate policies and mobility policies may be of help in order to contain the epidemic process”

Mobility monitoring & fine-grained targeted measures



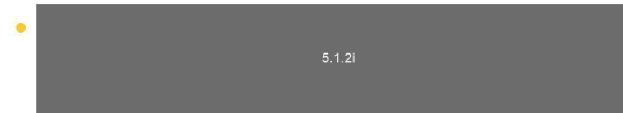
Mobility Visualisation Platform: MNO data products toolbox for near-real time monitoring of mobility and targeted measures available for nationally nominated contact points



Toolbox of data, code and platforms

Tool	Description
SIR models	Python code and reference data, including calibration routines and scripts for running scenarios
Mobility Functional Area dashboards	Near-real time visualisation of mobility data
Economic models: Trade-SCAN and RHOMOLO	User-friendly Excel-based simulator of GDP and employment impact, Model for regional economic impact

- Available for MS modellers and authorities



Conclusions

- Policy relevance: Communication call for scenario based work
- Novelty: EU-wide, regional-level, spatially explicit epi model
- Trade-offs health and wealth: moderate regional lockdown $R=0.95$ triggered later at $T=100-400$
- Locally targeted action: role of commuting, identification of functional mobility areas
- Toolbox available for Member States modellers and authorities