Uplifting of Covid-19 containment measures in Europe

Current situation, strategies and proposed JRC roadmap for mid to long term monitoring

Situation on 29/05/2020

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Executive summary

Each country in Europe is investing a considerable amount of effort in, on the one hand, defining a medium and long-term strategy through the adoption and gradual lifting of containment measures, and, on the other hand, minimising the economic impact of the covid-19-related crisis.

This technical report analyses the current situation, with a specific focus on the approaches at the European level and on a potential roadmap to capture more efficiently relevant data with regards to non-pharmaceutical containment measures.

Specifically, the aim of this report is three-fold:

- provide an overview of different approaches with regards to containment measures applied at a EU/EEA plus UK level: from the analysis of the four main categories of non-pharmaceutical measures (domestic movements, education sector activities, non-essential shops, events and gatherings) clearly emerge the different approaches and the reasoning behind them.

- provide an assessment of the impact of the lifting of containment measures based on the combined analysis of mobility and COVID-19 data compared to the timeline of the containment measures. Over the last month, a significant decrease of the lockdown mobility index can be detected in all the EU/EEA countries plus UK and there is not clear evidence of increase in the COVID-19 cases (both in the positive cases and in the fatalities) due to the combination of social distance measures implemented by the countries.

- Identify synergies between ongoing and newly planned activities, identify new requirements, and assess how the JRC database can best evolve to address these requirements. In particular, social and economic indicators need to be systematically monitored to provide a comprehensive analysis of the situation and/or provide elements to Member States for them to inform citizens on the international situation, and should be added to the database.

Based on the analysis, the following actions are recommended:

- Development of a subnational transmission map, as mandated in the Tourism and Transport Package of 13 May 2020.

- The development of an Early Warning System capable of providing Member States with (i) prompt information about critical contagion situations and possible new outbreaks of the disease and (ii) elements for the evaluation of the effectiveness of de-escalation approaches, simultaneously in health and economic terms.

- A Common database of measures linking health, social and economic indicators, based on a collaborative approach to feed the Early Warning System platform, as well as the socio-economic modelling on future scenarios.

The intended readership of the report is representatives to the COVID-19 Task Force, and JRC management and staff who have an interest in COVID-19 modelling.
1 Introduction

The Joint Research Centre (JRC) of the European Commission participates in the Commission-wide Task Force on the COVID-19 crisis. The aim of this Task Force is to ensure coherent and targeted approach in providing scientific support to the Commission through assessing and analysing the evolution of the Covid-19 health crisis and its impact on multiple sectors.

JRC has provided evidence, maps and analysis for numerous communications (Exit strategy, Testing, Tourism and transport, Disinformation). Many of these evidences were based upon the data and information collected in the JRC Covid measures database, quickly established at the beginning of the crisis to provide an open-access, flexible and daily updated platform, to depict the fast changing situation. Based on the same database, work is being carried out to monitor and model the COVID-19 outbreak and responses, to inform the dialogues within the Commission, and between the Commission and the Member States.

In this document we provide a picture of the current situation of the Covid-19 emergency in Europe, after a month from the first openings decided by the Member States, with the intention of identifying the temporal relations between the epidemiologic curve and the timeline of adoption/release of containment measures. Such information is in fact critical to establish an effective Early Warning System, capable to quickly identify critical areas and alert about possible new outbreaks of the disease.

This document outlines as well the needed evolution of the JRC Covid 19 measure database, to shift from the initial flexible and quick version, with only few categories considered to monitor and forecast the epidemiologic evolution of the situation, to a better detailed one, which includes categories on health, economy and societal impact, thus providing the needed input for assessing and forecasting the impact of the current emergency on the economic and touristic sectors as well.

We are, in fact, living a new phase of the Covid-19 emergency in Europe: the progressive release of containment measures started one month ago (i.e. early May 2020) and by the time of this report, the European scenario has deeply changed, in terms of closure of economic activities and services. There is a need to understand the effectiveness of the different approaches adopted by Member States to this new phase of the emergency and their impact on the epidemic evolution and, at the same time, on the national economies. A special focus is now on the tourism sector of the Member State’s economies, since this is heavily affected by the Covid-19 containment measures adopted, from the limitation to the national/international movements, to the access to tourist services and areas.

In Europe there is no harmonised approach to Covid-19 containment measures uplifting among Countries: different combinations of containment measures are released, at different stages (see Fig. 1 for current containment measures and Annex 1 for the monitoring period: 27 April 2020 – 27 May 2020). Moreover, the logic of the choices to reopen certain activities/services in the society or productive sectors is very different from country to country and, at times, follows opposite reasoning, even if all aimed at minimizing the contagion and the impact on the country’s economy. In many cases, the reopening is accompanied by conditions based on the current epidemiological situation which, however, is continuously changing and could lead back to the adoption of already uplifted measures.

In the Tourism and Transport Package (COM(2020)550), published on 13 May, the Commission lays out a coordinated framework to enable European citizens to benefit from a restful and above all, safe tourism season, gradually this summer and into the subsequent winter and beyond. It calls for preparedness plans that should be in place at all levels – from the EU and national levels down to the level of individual establishments, transport operators, and other segments of the tourism sector – so that appropriate action can be taken swiftly and in a coordinated manner, on the basis of explicit criteria.

Therefore, from now on, monitoring and forecasting the epidemiological data trends becomes essential not only to spot as quickly as possible new outbreaks of the disease spread, but also to identify effective but still safe-de-escalation approaches among all those adopted by the European countries, with the aim of minimizing the negative impact on the economy.

A close monitoring of COVID-19 cases in Europe, during this de-escalation phase of the emergency, should then serve two purposes: first, to provide an Early Warning System to Member States based on explicit criteria with regards to critical contagion situations and possible new outbreaks of the disease, thus providing timely recommendations in terms of adjustments of the implemented measures; second, to support the assessment
of policy scenarios (e.g. de-escalation phases proposed by Member States) simultaneously in health and economic terms.

Fig. 1 -Uplifting of containment measures in Europe: situation as of 27 May 2020.

In this document, chapter 3 provides an initial overview of the recommended approaches at international level on how to manage this specific phase of the emergency and investigates specifically the timeline of the epidemic and of the adoption of containment measures in three Countries which represent reference examples on a global level. Finally, examples of available platforms for monitoring the current epidemiological situation are provided, together with a summary of what is in the pipeline on the EU side, to handle the upcoming challenges related to the tourism sector.

Chapter 4 analyses the European scenario with regards to the closure/opening status of different services and shops and to the limitations to national/international movements. Chapter 5 investigates the mobility data, to find evidences of the release of containment measures and to identify the time needed before being able to observe the effects of lifting of those measures.

Finally, chapter 6 is about the ongoing cooperation between JRC and the European Centre for Disease Prevention and Control (ECDC), to develop a new version of the JRC Covid measures database, which integrates health, economic, societal categories, to make it useful for monitoring and forecasting the impact of the current situation on the economy and the tourist sectors.

Besides the JRC Covid-19 measure database, two main reference sources have been considered for the overview of the different approaches with regards to containment measures and for the description of the current situation with the progressive release of some of them. Respectively, the guidelines provided by the World Health Organization (WHO) were the main reference source for chapter 3, while the systematic situation reports of the European Centre for Disease Prevention and Control (ECDC) were the basis for describing the current situation in Europe (chapter 4 and 5).
2 Limitations

This report includes information on government measures available as of 29 May 2020. Combination of containment measures adopted by Governments are changing rapidly. Given the speed in which governments are amending or introducing new measures in response to COVID-19, the dataset and analysis are likely to have information gaps or to include information which are outdated due to the dynamic nature of the overall situation.

Misinformation and disinformation on COVID-19 is abundant. For our analysis we rely only on authoritative and official sources to get updated information on the COVID-19 outbreak. Therefore, in our databases and related analysis mass media information are not included if not confirmed from cross checking against authoritative sources.

The regional nature of our analysis forces us to make major simplifications, which sometimes show only the worst case expected scenarios. The details of the current situation are difficult to be captured, especially due to the vast variety of the criteria adopted by countries to decide upon the different combinations of measures to amend or introduce over time.
3 COVID-19 containment strategies

This chapter provides an overview of the Covid19 containment strategies suggested on a global level, as well as the recommended approaches for national action plans, and for the international community’s collaborative efforts.

In the last paragraph of this chapter ("Covid-19 situation monitoring and risk assessment"), a focus on the available platforms to monitor the epidemiological trends, as well as the governmental initiatives adopted to contain the contagion, are described. Reference to the main publicly available sources of data and information, as well as to the upcoming/ongoing collaborative efforts to effectively monitor this new phase of the Covid19 emergency is also provided.

3.1 WHO Strategic preparedness and response plan

The WHO “Strategic preparedness and response plan” (published on 14 April 2020) outlines the public health measures that the international community is ready to provide to support all countries to prepare for and respond to COVID-19. The document translates lessons learned on the virus into strategic actions that can guide the efforts of all national and international partners when developing context-specific national and regional operational plans.

Guidance for countries preparing for a phased transition from widespread transmission to a steady state of low-level or no transmission is also addressed. The document, among other things, highlights the coordinated support that is required from the international community to meet the challenge of COVID-19, including its broader social and economic impacts.

Countries are distinguished among those where there has been early action and implementation of comprehensive public health measures (i.e. leading to \( R \leq 1 \)) and those where community transmission has led to outbreaks with near exponential growth (\( R > 1 \)). In the first case, countries and subnational regions have suppressed the spread of COVID-19 below the threshold at which health systems become unable to prevent excess mortality. Countries that have been able to reduce transmission and bring outbreaks under control have maintained the ability to deliver quality clinical care, and minimize secondary mortality due to other causes through the continued safe delivery of essential health services.

In many countries where community transmission has led to outbreaks with near exponential growth, widespread population-level physical distancing measures and movement restrictions have been introduced in order to reduce the spread. Physical distancing measures and movement restrictions, often referred to as “shutdowns” and “lockdowns”, can slow COVID-19 transmission by limiting the contacts between people. However, such kind of containment measures can have a potential profound negative impact on individuals, communities, and societies, which bring social and economic life to a near stop. Moreover, such measures disproportionately affect disadvantaged groups, including people in poverty, migrants, internally displaced people and refugees, who most often live in overcrowded and under resourced settings, and depend on daily labour for subsistence.

\[ i.e. \text{the one in which many countries managed to slow down the contagion and start removing control measures while closely monitoring how this affects transmission rates and infection numbers.} \]

\[ https://www.who.int/docs/default-source/coronaviruse/covid-strategy-update-14april2020.pdf?sfvrsn=29da3ba0_19 \]

\[ Such as rapid case identification, rapid testing and isolation of cases, comprehensive contact tracing and quarantine of contacts. \]

\[ To date, there is no unique, internationally agreed definition for these kinds of terms. International organizations are adopting similar but jet different definitions for the word “lockdown”, some of them even distinguishing between full and partial lockdown. For our analysis, we defined a Lockdown Mobility Index \( LMI = (Mobility \text{ data } T_f - Mobility \text{ data } T_{baseline}) \) as described in “A. Annunziato, P. Probst, C. Proietti, M. Santini, COVID-19: Analysis of Lockdown & Reopening, European Commission, JRC Ispra, 2020, JRC120584”. \]
3.2 Global strategy to respond to Covid-19

The overarching goal of the WHO Global strategy to respond to Covid-19 is for all countries to control the pandemic by slowing down the transmission and reducing mortality associated with COVID-19.

Among the global strategic objectives, which span from the mobilization of all sectors and communities (to ensure that society takes ownership of and participates in the response and in preventing cases) to the provision of appropriate clinical care and the development of safe and effective vaccines, the following are also included, closely related to the possibility of having dedicated monitoring and early warning systems:

- Control sporadic cases and clusters and prevent community transmission by rapidly finding and isolating all cases, providing them with appropriate care, and tracing, quarantining, and supporting all contacts.
- Suppress community transmission through context-appropriate infection prevention and control measures, population level physical distancing measures, and appropriate and proportionate restrictions on non-essential domestic and international travel.

Every country was encouraged to implement a comprehensive set of measures, calibrated to its capacity and context, to slow down transmission and reduce mortality associated with COVID-19, ultimately with the aim of reaching and/or maintaining a steady state of low-level or no transmission.

3.3 Timeline of COVID-19 epidemic: global case studies

Many countries implemented strict sets of measures, which all together were called “lockdown”. Since, to date, there is no unique, internationally agreed definition for such terms, comparing the effectiveness of a “lockdown” status among countries is not entirely reliable. However, even if not fully comparable, searching for the length of time between the adoption of such measures and the epidemiological evidence of their impact provides useful information in terms of guidance for future policies. Below we report about three examples of such kind of information.

China

The coronavirus outbreak was first identified in the city of Wuhan (Hubei province) in December 2019. China was the first country to put a lockdown into effect in a bid to curb the spread of coronavirus across the nation. On January 23, 2020 the city of Wuhan - the centre of the outbreak - was put in lockdown, followed by other 15 cities on the day after. This decision followed the explosion of the number of new cases registered on 21st January 2020.

On March 22, i.e. 59 days after the lockdown was first introduced, China started to relax some measures. Wuhan officials eased outgoing travel restrictions on April 8, effectively ending the city’s 76-day lockdown. For more than two months, public transport in Wuhan was suspended, businesses were shut, and millions of residents were confined to their homes and residential communities were not even allowed to go outside for grocery shopping. Despite the lifting of most strict lockdown laws, as of the end of April, many stores were still shut, restaurants were restricted to take away and even when citizens went outside, they still wore protective equipment and tried to avoid each other5.

On May 10, 2020 17 new cases were reported to the Chinese authorities. It was the second day of a double digit rise and the highest number of cases in almost two weeks. These cases were reported from Shulan (12 cases), a city near the Russian and North Korean borders, and in the city of Wuhan (5 cases, the highest number of new infections since March 11), where the virus originated. In the recent weeks China has enacted border closures and social restrictions again on areas bordering Russia, after some people returning to China were diagnosed with Covid-19. Authorities imposed draconian restrictions again in Shulan and Wuhan, to quash the new outbreaks. The forceful response of China’s leaders reflects fears about the potential for a fresh wave of infections after the recent relaxation of containment measures in the Country. As of May 21, 2020, the latest outbreak was reported to occur in the north-eastern province of Jilin, with 130 new cases and 2 deaths. Where

the stricter measures have been enforced, the situation is very similar to the lockdown imposed at the beginning of the crisis in Wuhan. The timeline of the epidemic in the province of Hubei, where Wuhan is located, and of the containment measures adopted in the early phases of the emergency is summarised in figure 3.

Globally, as of 27 May 2020, there have been 5,488,825 confirmed cases of COVID-19, including 349,095 deaths, reported to WHO. Of those total numbers, 84,544 confirmed cases and 4,645 deaths have been reported to occur in China (source: [https://covid19.who.int/](https://covid19.who.int/)) and the number of new reported cases is 1.

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**Fig. 2 - Confirmed Covid-19 cases in China over time**

![Confirmed Cases Over Time](https://covid19.who.int/)

**Fig. 3 - Identification of measures taken in Hubei province, China (Source: medium.com)**

To summarize the main steps of the mentioned timeline, the following is observed:

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<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Delay from lockdown/containment measures adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak of the number of daily confirmed cases</td>
<td>13 February 2020</td>
<td>21 days</td>
</tr>
<tr>
<td>First uplifting of measures in China</td>
<td>22 March 2020</td>
<td>59 days</td>
</tr>
<tr>
<td>First day with no new deaths for Covid-19</td>
<td>7 April 2020</td>
<td>75 days</td>
</tr>
<tr>
<td>First uplifting of measures in Wuhan city</td>
<td>8 April 2020</td>
<td>76 days</td>
</tr>
<tr>
<td>New wave of scattered outbreaks in the Country</td>
<td>10 May 2020</td>
<td>108 days</td>
</tr>
</tbody>
</table>

Tab. 1 - Main steps of the coronavirus outbreak in Hubei province, China.

New Zealand

On May 4, media\(^7\) reported New Zealand having had its first day with no new Covid-19 cases since before lockdown. The last time there were no new Covid-19 cases on a single day in New Zealand was on 16 March, ahead of the national lockdown which was brought in on 25 March\(^\) and before the daily briefings by health officials began – when the total number of cases was rising by one or two at a time. New Zealand’s government has won international praise, including from the World Health Organization, for the swift and strict lockdown imposed as cases in the country began to increase more rapidly. No one had died of the virus at the time the shutdown was imposed.

Measures were relaxed slightly on April 27, when the looser rules allowed slightly more freedom of movement and more businesses to re-open, although they can only trade in completely contactless ways.

New Zealand adopted a 4-level Alert System for Covid-19 emergency (respectively: 1-prepare; 2-reduce; 3-restrict; 4-lockdown), which specifies measures to be taken against COVID-19 at each level. The Country moved to Alert Level 2, which means that many of the everyday activities can be resumed provided that safety rules are followed, on Wednesday 13 May. From Friday 29 May, gatherings can be held with up to 100 people.

The epidemic curve of the daily number of confirmed and probable cases in New Zealand as of May 27, 2020 is shown in the chart below (fig. 4).

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\(^7\)New Zealand records first day with no new Covid-19 cases since before lockdown

To summarize the main steps of the mentioned timeline, the following is observed:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Delay from lockdown/containment measures adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>National lockdown</td>
<td>25 March 2020</td>
<td>n.a.</td>
</tr>
<tr>
<td>Peak of the number of daily confirmed and probable cases</td>
<td>28 March 2020</td>
<td>3 days</td>
</tr>
<tr>
<td>First day with no new Covid-19 cases</td>
<td>4 May 2020</td>
<td>40 days</td>
</tr>
</tbody>
</table>

In conclusion, only 3 days were needed to reach the peak of contagion after the adoption of lockdown measures and more than a month to register the first day without new Covid-19 cases. This timing is the one of a country whose effectiveness in handling the Covid-19 emergency was internationally recognized as exceptional.
Republic of Korea

The reported start of Covid-19 pandemic in the Republic of Korea was on 19 January 2020. A total of 346 confirmed cases were reported on 21 February 2020, according to the Centers for Disease Control and Prevention Korea (KCDC), with the sudden jump mostly attributed to “Patient 31” who participated in a gathering at a Shincheonji Church of Jesus the Temple of the Tabernacle of the Testimony church in Daegu.

The peak on the daily number of cases was registered on 29 February 2020 (forty days after its first confirmed case on January 20 – with 909 new cases and up nearly 500 from the previous day). It became the second most infected country after China by early March.

South Korea undertook an immediate and massive public and private sector effort to fashion a national response to the pandemic. It used a combination of widespread testing, aggressive contact tracing, stern public health measures and digital technology to contain the coronavirus without having to impose a widespread lockdown. It also maintained a strict quarantine regime.

Republic of Korea’s drive-through testing gained media attention around the world and was hailed as an ingenious measure to protect healthcare workers from exposure while providing expeditious results to prospective patients. Thanks to the mentioned measures, newly diagnosed cases have slowed and the national death toll stood at 256 as of Friday 8 May, according to its Centers for Disease Control and Prevention.

Against that backdrop, the Government of Republic of Korea on Wednesday May 6, 2020 started to relax its strict social distancing rules, imposed on March 22, but only in line with a set of guidelines referred to as the "distancing in daily life" policy. As the country’s Center for Disease Control and Prevention stated, the policy "should not be interpreted as implying a return to 'normalcy' as before the outbreak but rather as an effort to achieve both infectious disease prevention/control and everyday life."

But the emergence Friday 1st of May of more than a dozen new cases linked to an individual who visited three nightclubs in Seoul last weekend served as a warning of how quickly the virus can regain a foothold. Officials swiftly advised clubs and bars to close for the next month.

South Korea reported 25 new COVID-19 cases on Sunday 24 May, as the country steps up efforts to bring the latest infections tied to the capital Seoul’s nightlife district under control.

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9 According to these guidelines, people should stay at home if they become sick with suspected Covid-19 symptoms, continue to keep a distance of 2 meters (6 feet) from others, wash their hands for 30 seconds and keep rooms well ventilated and disinfected regularly. Those aged over 65 and in high-risk groups should continue to stay home and avoid enclosed and crowded spaces.
This is the summary of the main steps of the mentioned timeline:

- Peak on the daily number of cases: 29 February 2020
- Social distancing rules: 22 March 2020
- Start of relaxation of social distancing rules: 6 May 2020

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Delay from lockdown/containment measures adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak on the daily number of cases</td>
<td>29 February 2020</td>
<td>n.a.</td>
</tr>
<tr>
<td>Social distancing rules</td>
<td>22 March 2020</td>
<td>n.a.</td>
</tr>
<tr>
<td>New outbreak in the Country</td>
<td>1 May 2020</td>
<td>n.a.</td>
</tr>
<tr>
<td>Start of relaxation of social distancing rules</td>
<td>6 May 2020</td>
<td>45 days</td>
</tr>
</tbody>
</table>

Tab. 3 - Main steps of the coronavirus outbreak in the Republic of Korea.
3.4 National strategies to respond to Covid-19

WHO guidelines recommend all countries to increase their level of preparedness, alert and response to identify, manage and care for new cases of COVID-19. Countries should prepare to respond to different public health scenarios, recognizing that there is no one-size-fits-all approach to managing cases and outbreaks of COVID-19. Each country should assess its risk and rapidly implement the necessary measures at the appropriate scale to reduce both COVID-19 transmission and economic, public and social impacts.

The combination of public health measures that should be implemented at any one time will depend to a large extent on whether there is community transmission, clusters of cases, sporadic cases, or no cases and the capacity of the public health system. WHO in fact defines four transmission scenarios for COVID-19:

1. Countries with no cases (No cases);
2. Countries with 1 or more cases, imported or locally detected (Sporadic cases);
3. Countries experiencing cases clusters in time, geographic location and/or common exposure (Clusters of cases);
4. Countries experiencing large outbreaks of local transmission (Community transmission).

Countries could experience one or more of these scenarios at the sub-national level and should adjust and tailor their approach to the local context. Countries should prepare to respond to all transmission scenarios. Prioritization and focus of resources for each technical area will depend on which transmission scenario(s) a country is managing.

The ongoing situation observed in Europe shows that the majority of countries are currently facing a “community transmission” type of scenario, i.e. large outbreaks of local transmission of Covid-19 disease (fig. 1 shows the example of Spain as of week 18 of 2020). However, since the majority of them managed to reduce the value of R below 1, it is likely that in the coming months, they may be facing a “clusters of cases” transmission scenario, experiencing cases clusters in time, geographic location and/or common exposure.

Finally, among the core pillars of an effective national response, set out in detail in the WHO “COVID-19 Strategic Preparedness and Response Plan” - SPRP[10], the following were included:

- Begin establishing metrics and monitoring and evaluation systems to assess the effectiveness and impact of planned measures
- Conduct regular operational reviews to assess implementation success and epidemiological situation, and adjust operational plans as necessary

3.5 International community’s response to Covid-19

The scale of the COVID-19 crisis requires a significant shift in the international system to support countries to plan, finance and implement their response. Countries need authoritative real-time information on the evolving epidemiology and risks; timely access to essential supplies, medicines and equipment; the latest technical guidance and best practices; rapidly accessible and deployable technical expertise, access to an emergency health workforce and medical teams; and equitable access to newly developed vaccines, therapeutics, diagnostics and other innovations, as well as complementary socio-economic measures, including material and protection assistance.

Particular attention and support will be required in countries with low-capacity and humanitarian settings ill-equipped to cope with COVID-19 due to weak health systems and workforces that are heavily reliant on the support of donors, UN and NGO partners.

The first pillar of the recommended international community’s response in WHO guidelines is the coordination and monitoring of country preparedness and response.

The European Commission is coordinating a common European response to the coronavirus outbreak. President von der Leyen has established a Coronavirus response team at political level to coordinate our response to the pandemic. This team brings together all the many different strands of action and consists of three main pillars: 1) the medical field, working on prevention and procurement and relief measures and foresight, 2) the mobility, from transportation to travel advice, as well as Schengen-related questions, 3) the economy - looking in-depth at various business sectors – such as tourism or transport, and trade, as well as value chains and macro-economy.

A number of key policy documents has been issued by the European Commission, among which:

- “COVID-19 Guidelines for border management measures to protect health and ensure the availability of goods and essential services” (Brussels, 16.3.2020 C(2020) 1753 final): this document set out principles for an integrated approach to an effective border management to protect health while preserving the integrity of the internal market and preventing shortages of medical equipment or food. The single market being not only an economic issue but a key instrument of European solidarity. This document was followed by another one, “COMMUNICATION FROM THE COMMISSION on the implementation of the Green Lanes under the Guidelines for border management measures to protect health and ensure the availability of goods and essential services” (Brussels, 23.3.2020 C(2020) 1897 final), through which practical advice was provided to Member States on how to ensure continuous flow of goods across EU via the so-called green lanes.

- “Commission Notice Interpretative Guidelines on EU passenger rights regulations in the context of the developing situation with Covid-19” (Brussels, 18.3.2020 C(2020) 1830 final) to ensure EU passenger rights are protected and applied in a coherent manner across the EU, in light of the mass cancellations and delays.

- “COVID-19 Guidance on the implementation of the temporary restriction on non-essential travel to the EU, on the facilitation of transit arrangements for the repatriation of EU citizens, and on the effects on visa policy” (Brussels, 30.3.2020 C(2020) 2050 final): a practical guidance on implementing the temporary restriction on non-essential travel to the EU. Together with guidance to ensure free movement of critical workers, this responds to requests made to facilitate transit arrangements for repatriated citizens and seeks to address citizens’ and companies’ practical concerns about the

measures taken to limit the spread of the coronavirus, as well as of national authorities implementing the measures.

- “Communication from the Commission - Guidelines on COVID-19 in vitro diagnostic tests and their performance” (2020/C 122 I/01). The guidance aims to support Member States in effectively using testing tools in the context of their national strategies and during the different stages of the pandemic, including when phasing out confinement measures.

- “Joint European Roadmap towards lifting COVID-19 containment measures” - The Commission, in cooperation with the President of the European Council, put forward a European roadmap to phase-out the containment measures due to the coronavirus outbreak. The roadmap lists principles and recommendations Member States should consider when planning to lift containment measures.

- “Communication from the Commission - Guidance on Apps supporting the fight against COVID 19 pandemic in relation to data protection” (2020/C 124 I/01) on developing new apps that support the fight against Coronavirus in relation to data protection. It aims to offer the framework to guarantee that citizens have sufficient protection of their personal data and limitation of intrusiveness while using such apps. This guidance is accompanying an EU toolbox on contact tracing apps.

- “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Tourism and transport in 2020 and beyond” (Brussels, 13.5.2020 COM(2020) 550 final). The Commission presented a set of guidelines and recommendations to help Member States gradually lift travel restrictions and allow tourism businesses to reopen, after months of lockdown.

3.6 COVID-19 Situation monitoring and risk assessment

Ongoing, comprehensive and verified global surveillance data about COVID-19 is crucial for response at the global, national, and local levels. Epidemiological surveillance information is collected from all countries, territories, and areas and is made accessible through multiple channels. At the same time, the same type of activity is fundamental for the monitoring of disease containment measures adopted/uplifted by countries. Only a continuous, validated monitoring of both types of information allows to gain a clear understanding of the impact of the disease containment measures on the epidemiological trends and, consequently, to rapidly adapt a suite of containment measures to apply at a given moment, in the considered area.

Both the EU and UN are active in this respect and they make available dynamic platforms where updated data, latest situation reports, epidemiological curve and global distribution, current risk assessments as well as public health guidance and advice on response to countries can be accessed. Some examples are provided below:


JRC: https://covid-statistics.jrc.ec.europa.eu/


WHO: https://covid19.who.int/


Moreover, other useful dashboards are also available, from UN trusted NGOs such as ACAPS (https://www.acaps.org/projects/covid19/data), or reference research/universities institutes such as the London School of Hygiene and Tropical Medicine (monitoring dashboard: https://vac-lshtm.shinyapps.io/ncov_tracker/; interactive modelling: https://cmmid.github.io/visualisations) or the Oxford Covid19 government response tracker (https://covidtracker.bsg.ox.ac.uk/) just to mention few of the many.
Given the vast variety of efforts on one side, and the speed, scale and severity of the Covid-19 pandemic, it is clear the importance of coordinated actions among all relevant organisations to get the most out of each and everyone’s contribution.

The global response to the COVID-19 pandemic requires the capacity to conduct ongoing risk assessment at the global, regional, national, and subnational levels. To fully leverage the investments and capacities for data collection and analysis for risk assessment, a new global public health data architecture will be required. The foundations of such an architecture have already been laid through the creation of the Epidemic Intelligence from Open Sources (EIOS) data platform, which enables multiple communities of users to collaboratively assess and share information about outbreak events in real time. The future vision of the new data architecture has been articulated by the EPI-BRAIN initiative (https://www.epi-brain.com/), which harnesses cutting-edge tools for big data, crowdsourcing and artificial intelligence to mitigate the impact of epidemics by allowing stakeholders to merge public health data with data on the myriad, complex factors that drive epidemics, including human and animal population movement, animal diseases, environmental and meteorological factors, using advances in language processing and machine learning to provide a more comprehensive analysis that helps to predict outbreaks and track their spread (source: https://www.who.int/docs/default-source/coronaviruse/covid-strategy-update-14april2020.pdf?sfvrsn=29da3ba0_19).

More specifically, about the monitoring of the governmental measures to contain Covid19 contagion, an important initiative, in this direction, has been promoted by the World Health Organization, to create a collaborative database that brings together information on the hundreds of different interventions that have been introduced worldwide. The platform, being prepared for WHO by a team at the London School of Hygiene and Tropical Medicine, gathers data collected by ten groups already tracking interventions — including teams at the University of Oxford, UK, the Complexity Science Hub Vienna (CSH Vienna), and public-health organizations and non-profit organizations such as ACAPS, which analyses humanitarian crises (source:https://www.nature.com/articles/d41586-020-01248-1?utm_source=Nature+Briefing&utm_campaign=a72c706ac2-briefing-dy-20200428&utm_medium=email&utm_term=0_c9dfe39373-a72c706ac2-44729237).

In sight of the upcoming summer season and the connected tourist activities, the European Commission is now focussing on the development of a database for the Directorate General GROW - for Internal Market, Industry, Entrepreneurship and SMEs. The database should feed an App for citizens, to provide them with reliable information on tourism, such as which countries can be visited by the citizens of which, existing bilateral agreements, contagion containment measures in place in each destination. The database should be fed/validated by Member States.

The above makes clear that a large volume of information is available in a plethora of different platforms. A coordinated approach and cooperation initiatives are utmost recommended to derive the most out of the efforts in place, to better benefit from the different competences and expertise and, most importantly, to gain a comprehensive overview of the information gaps and duplications. For this reason, JRC has started a close cooperation with ECDC, to quickly merge the respective databases on Covid containment measures, into a new, better detailed version, useful to feed both, epidemiological and economic models as well as, if possible, contributing to the applications on tourism under development (see chapter 4 for further details).
4 Lifting COVID-19 containment measures in EU/EEA+UK

Globally, each country is implementing national action plans based on a whole-of-society approach and a realistic appraisal of what is feasible to achieve first in terms of slowing down transmission and reducing mortality, and subsequently in terms of sustaining low-level transmission while society and economic activity resumes. Efforts are put in place to ensure plans flexible enough to react to rapidly changing epidemiological situations in different parts of the country and consider the local contexts and capacities to respond.

For countries that have introduced widespread physical distancing measures and population-level movement restrictions, there is an urgent need to plan for a phased transition away from such restrictions in a manner that will enable the sustainable suppression of transmission at a low-level whilst enabling the resumption of the economic and social life, prioritized by carefully balancing socio-economic benefit and epidemiological risk. Without careful planning, and in the absence of scaled up public health and clinical care capacities, the premature lifting of physical distancing measures is likely to lead to an uncontrolled resurgence in COVID-19 transmission and an amplified second wave of cases.

In Europe, up to the time of reporting, each country is putting significant effort in defining an approach to fine tune the Covid-19 containment measures to keep while allowing the economy to start again, after the initial stop imposed by the national lockdown decided in most of them.

This section provides an overview of the various approaches adopted with countries, together with the main principles behind them. In the JRC Covid-19 database, four main categories of containment measures have been included: domestic movements, education sector activities, non-essential shops, events and gatherings (see fig. 7). In our previous analyses (see Annunziato et. Al., 2020, a, b), the effect of each one of these containment measures was modelled with an extra addition to the reproduction number R. Each intervention is given a fictious value, in line with values used in other modelling studies. The values are although still hypothetical as adding all values together would mean that no spread of infection takes place. As still no scientific evidence is available or real quantities of these are available, the study uses the hypothetical values. When scientific evidence is made available the values can be adjusted to these. The mentioned containment measures, at the beginning of the epidemic, have been used by summing up all the contributions and obtaining an overall factor F that was used to be multiplied by R as shown in the equation of figure 8.
Fig. 7 - Uplift of containment measures: percentages of Countries applying/lifting them over the month of May 2020 (Source: JRC Covid-19 measures database, https://covid-statistics.jrc.ec.europa.eu/ update as of 29 May 2020. The percentage value refers to percentage of the Countries implementing the measure).
4.1 Domestic Movements (Reduction factor of R0: 30%)

Freedom of movement within the national borders is limited in various ways at the moment. 22% of the European countries were limiting domestic movements only to those with certified reasons of necessity and/or urgency (e.g. to get supplies of drugs/food, for working or health reasons) up to the 30th of April 2020. This percentage reduced to 13% around mid-May and to 6% as of the 29 of May. Governments gradually eased these measures, as long as certain precautionary measures are respected, such as ensuring the minimum distance among individuals or wearing facial masks in public places. Therefore the “stay at home” became more and more a recommendation, rather than an obligation. On the 29 of May there were 13% of the countries in which no limitations to the domestic movements were imposed anymore. The majority (58%) are in the process of progressively uplifting the restrictions still in place (e.g. Italy will decide beginning of June if the limitation of domestic movements within the same region will be uplifted or not).

Of the 58% of countries with a partial ban on domestic movements as of today (29 of May), many are applying limitations only for people especially at risk, like those with an underlying medical condition and or those over a certain age. Other countries are applying curfews before/after certain hours. Finally, some governments decided to limit freedom of movement within subnational boundaries at “Admin level 2” (e.g. only within municipality) or at “Admin level 1” (e.g. only within region).

Only a minority of European countries (i.e. 13%) are not applying, as of today, limitations to the freedom of movement within their borders. In the case of Denmark, for example, the gradual reopening of the society, which implies the freedom of movement within the country as of 30 April 2020, requires that everyone still adhere to the guidelines on social distance and hygiene advice. National authorities communicated clearly that effective
action against the spread of COVID-19 in Denmark requires that each citizen takes responsibility for reducing the number of social contacts and ensuring proper distance to his or her citizens. This also applies within the family and circle of friends. In the case of Czech Republic, the ban on free movement was cancelled on Apr 24th, however, free movement of people outside and during sports activities will be possible only for groups of up to 10 people.

4.2 Education sector activities (Reduction factor of R0: 20%)

One clear example of different ways of reasoning behind the adopted openings calendars is the educational sector. The first big difference observed is between countries where the entire educational sector closure was implemented (e.g. Italy) and those where only a partial closure has been adopted, for example, keeping day-care nurseries and primary schools open for, at least, children of parents working in one of the essential services sectors (e.g. health, fire-fighting, police,...) (e.g. Lithuania).

The second important difference is related to the levels of educational sector to be opened first: some countries, like the Scandinavian ones, opened the lower levels first (e.g. day-care nurseries and primary schools), while keeping the higher levels of education closed because the students of secondary schools could be independent in being at home while parents were working. On the contrary, some other countries preferred to keep the lower levels of education closed while they progressively opened the higher ones, because the minimum distances among students can be observed only from a certain age and up (e.g. Norway).

Finally, in some countries, the decision on the opening date was delegated to the local authorities (either the municipality or the specific educational institute). For example, in Denmark “schools reopened as soon as possible from Wednesday, April 15, 2020, and as soon as the municipal council, according to the guidelines of the health authorities, considers it sound”. Similar decision is also adopted in Belgium where, as of 18 May 2020, each community is responsible for executing this decision in its own territory, in consultation with the education sector.

Overall, the current situation in the educational sector reopening shows that 58% of the European countries are progressively reopening their educational sector 13% of the countries completely opened the education services again. The remaining 29% have still the education sector closed, with lessons being performed from remote in many cases.

4.3 Non-essential Shops (Reduction factor of R0: 20%)

As with the education sector, the opening situation of so-called “non-essential shops" is extremely diverse in Europe. Despite a common understanding of what is to be considered an essential shop/service, there are several criteria which have been adopted by countries to decide upon their closure/opening.

Some are distinguishing them according to an aerial extension criteria (e.g. Austria, Iceland); some others are considering if the shops can guarantee multiple access to the building so as to ensure one-way circulation of the clients (Estonia); other countries prefer a time criterion, to regulate customer access at different times of the day (e.g. Latvia). Finally, the different criteria are also used by countries in different combinations. What seems to be quite transversal to most countries at the moment is the compulsory use of facial masks in all indoor public spaces.

An important feature of these data is that the long list of productive activities, services and wholesale or retail trade businesses are scheduled to be reopened in a very gradual way and in clusters of activities which are different from country to country.

Moreover, the reopening plan of the “non-essential shops/services” is made of a number of subsequent dates and only the first one of those is captured in our analysis, to describe the current and expected situation of this measure, as well as to model the expected impact on the epidemiological data. This is a major simplification, which shows the worst-case outcomes. Member States are in reality planning a gradual exit from the crisis, the details of which are difficult to capture, given the nature of our analysis. The main difficulties are due to the variety of the criteria adopted by countries to decide upon the different combinations of activities to be reopened over time.
From the data available in JRC DB on containment measures, the situation as of the 29th of May was: 3% of countries have the “non-essential shops/services” closed; 58% have them partially closed and 39% of the European countries have these businesses open. The situation significantly changed over the month of the May 2020, shifting from 42% of countries with non-essential shops closed and 55% with them partially closed at the end of April, to the mentioned current situation.

4.4 Events and gatherings (Reduction factor of R0: 20%)

Events and gatherings have obviously been classified according to the number of people allowed to meet. Numerical thresholds are, again, very different from country to country, ranging from a minimum of few individuals allowed to meet (e.g. 2 in Italy, outdoor, at the beginning of May) to a maximum of about a hundred (e.g. 50 in Iceland; 100 in Lithuania).

In addition, different numerical thresholds are applied for indoor and outdoor gatherings, and in some cases a specific ratio is given with regards to number of people per square meter (e.g. grocery stores in Iceland). Bans on gatherings are valid only for public places in certain countries while also in private ones in others (e.g. in Italy).

Overall, where the events/gatherings are banned, there is often an exception for weddings/funerals and religious services, with a limited number of participants allowed (e.g. Italy allows funerals with up to 15 people; Poland allows religious services if the limit of 1 person for 15 sqm is guaranteed).

As of the 29th of May, 45% of the European countries applied a ban on events/gatherings. The remaining 55% is applying only a partial ban. Events/gatherings allowed are often those outdoors, with limitations on the maximum number of individuals, minimum distance criterions (1 or 2 meters among individuals) and the requirement to wear face masks. Often the first outdoors events to be allowed are individual sports activities and sports competitions. According to our data, there is still no country in Europe where events/public gatherings are allowed without restrictions.

The next chapter will look at the effectiveness of these containment measures, based on the available data.
5 Effects on mobility and COVID-19 transmission

The availability of mobility data at national level has proved to be a valuable tool for monitoring the impact of the adopted infection containment measures on the national movements.

JRC acquired the Mobile Network Operator data, but unfortunately at the time of reporting, the coverage is not complete in all the EU/EEA + UK countries. As of 27 May 2020, the following mobility data are available for most of the countries:

- **Google mobility reports**, updated as of 16 May 2020, which take into account different categories of places as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces and residential: [https://www.google.com/covid19/mobility/](https://www.google.com/covid19/mobility/)

- **Apple mobility reports**, updated as of 24 May 2020, which consider different categories of movements (driving, transit and walking) [https://www.apple.com/covid19/mobility](https://www.apple.com/covid19/mobility)

From the analysis of the trends (figure 9), starting from mid-April, a **general decrease of the lockdown mobility index** (see Annex 2) can be observed among all the EU/EEA Countries plus UK, as a result of the recent implementation of the gradual up-lifting of targeted containment measures by national authorities.

The decrease has significant differences in the trend among the countries. The countries where the recent decrease of the lockdown mobility factor is more evident are Denmark and Germany. In Italy and Spain the trend is almost stable, with a minimum decrease detectable over the last two weeks. Sweden has a constant lower value of lockdown from mobility data.

The EU lockdown mobility trend over the period can be extracted from the average values of all the Countries (figure 10). The EU trend has been compared to the timeline of the implementation of national containment measures, starting from the enforcement of the national measures in Italy on the 10 March, to the first uplift in Denmark on 14 April. A peak in the lockdown can be detected during the Easter weekend, meaning that the EU citizens have significantly reduced their mobility during the Easter vacation. From mid-April, a **general decrease of the lockdown trend based on mobility data can be observed**, as a result of the recent implementation of the gradual up-lifting of targeted containment measures by national authorities. From the beginning of May, an acceleration in the mobility trend can be detected.

A general anticipation of the upcoming containment measures can be detected in the mobility trend in almost all the countries, both as enforcement of the measures, usually recommendations come first of the implementation of the measures. The same is detectable in the days before the upcoming lifting of the measures.

Very promising analysis has been performed also at sub-national level in Italy (Michaela A. C. Vollmer et al., 2020), and this should be extended at EU level.

To assess the early evidence of the lifting of the containment measures, the following data have been compared at national level:

- timeline of containment measures,
- COVID-19 cases (daily positive and fatalities),
- Mobility data (in particular the Lockdown mobility index derived by Google mobility data).

The charts related to this analysis for **Italy**, **Belgium**, **Germany** and **Sweden** are shown below (Fig. 11). The analysis of some countries that already started the lifting of restriction measures shows slight signals of reincrease or stabilization of the number of cases but not a marked increase, despite more than 3 weeks from the first uplift of the measures has passed, and the Lockdown mobility index clearly reflected the uplift.

As a preliminary result of this analysis, a tentative timeline has been extracted (Table 4), which needs further analysis to be validated:

- From the implementation of the main containment measure, to see the impact on the full implementation on mobility data, it takes around **3-4 days**, depending on the country.
- It takes around **1.5 week** to see the effect of the measure on the curve of positive cases;
- The first uplifting of the measures has been implemented on the 4 May in all the analysed countries (except for Sweden) and a **decrease of the lockdown mobility index** has been registered already from the 30 April.

- **There is not clear evidence of increase in the COVID-19 cases** (both in the positive cases and in the fatalities) due to the combination of social distance measures implemented by the countries.

<table>
<thead>
<tr>
<th>Containment measure</th>
<th>Data</th>
<th>Time shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enforcement of the measure</td>
<td>Mobility data</td>
<td>3-4 days delay</td>
</tr>
<tr>
<td>Implementation of the measure</td>
<td>COVID-19 positive cases</td>
<td>1.5 week delay</td>
</tr>
<tr>
<td>Implementation of the measure</td>
<td>COVID-19 fatalities</td>
<td>2.5 weeks delay</td>
</tr>
<tr>
<td>Uplifting of the measure</td>
<td>Mobility data</td>
<td>1 week in advance</td>
</tr>
<tr>
<td>Uplifting of the measure</td>
<td>COVID-19 positive cases/fatalities</td>
<td>No clear evidence of increase at national level in the COVID-19 cases (both in the positive cases and in the fatalities) due to the combination of social distance measures implemented by the countries.</td>
</tr>
</tbody>
</table>

*Tab. 4 - Tentative timeline of the impact of the implementation of containment measures on COVID-19 and mobility data.*

In terms of monitoring and Early-Warning, this comparison is very important because the evidence of the increase of the contagious based on epidemiologic data can be clearly detected only after 2 weeks, while an exceed in the social interactions based on mobile data can be available almost in real time, even before than the implementation of the non-pharmaceutical measure. As soon as those data will become available for the all Europe in a harmonized mode, further detailed analyses will be possible.
From mid-April, a general decrease of the lockdown trend based on mobility data can be observed, as a result of the recent implementation of the gradual up-lifting of targeted containment measures by national authorities.

Fig. 10 - EU Lockdown mobility index based on Apple mobility data compared to the timeline of the implementation of containment measures. The colorbar of the lockdown measures refers to the legend used in the previous maps and charts (blue: prevalence of regional/partial measures; red: prevalence of national measures).
Further analysis have been performed also by ECDC for the evaluation of public health measures, notably to understand the expected impact of their implementation or release on disease transmission-related indicators (ECDC 2020, a). On the basis of the current implemented containment measures, the majority of countries show a decreasing trend, both in cases and deaths for the short-term projections within a 30-day time horizon. Most notably in countries without a pronounced epidemic peak, the projection shows a moderately increasing or flattening trend (e.g. Bulgaria, Poland) and for some countries moderate downward trends (Hungary, Romania, Sweden and the United Kingdom).
6 Information gaps and evolution of JRC COVID-19 measures database

In the previous chapters we discussed the measures and their effectiveness based on actual data. In this chapter we will describe how JRC can improve its COVID-19 database, to improve its usefulness in understanding the impact of COVID-19 measures on health, and social and economic aspects.

The JRC is improving the COVID-19 epidemiological model to allow for more fine grained analysis of de-escalation measures. This is the beginning of a continuous improvement and development process, based on new evidence and in collaboration with ECDC and academic partners. The aim is to improve the model to make it fit for use as an (internal) monitoring and/or early warning system at EU level in the coming months.

JRC is combining its epidemiological model with socio-economic modelling capacity to get a more comprehensive overview of the situation. In this context, the collection of quantitative data is needed to support a transition from general to targeted containment measures. Hence, the current JRC Covid measures database is being revised, to include data and information on the production sectors, as well as to converge -in terms of taxonomy- with the existing ECDC database on containment measures.

The JRC science for policy report “JRC COVID-19 de-escalation modelling: framework for linking health and socio-economic factors” (T. De Groeve et al., 2020) provided preliminary results at EU level on the relative contribution of sectors to the Covid-19 transmission and economic impact. Out of the 21 production sectors considered, five resulted having the highest internal exposure\(^{11}\) were: health (26%), manufacturing (18%), construction (13%), accommodation and food services (12%), wholesale/retail (11%). Those with highest transmission potential\(^{12}\) (interface to general population) were: retail & wholesale (34%), health sector (23%), accommodation and food sector (14%).

The above mentioned results were ordered by decreasing exposure and transmission potential, to identify the more relevant sectors, in terms of Covid-19 potential contagion, to include in a new version of the JRC Covid19 Database. Only for those with exposure and/or transmission potential parameters different from zero we tried to identify the corresponding category of containment measures considered in the JRC Covid19 Database (fig. 12).

![Fig. 12 - Economic sectors ordered by % exposure and transmission potential and mapped against the available information currently available in JRC Covid19 database.](image-url)

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\(^{11}\) The number of daily contacts within a sector (with colleagues) is representative of the internal exposure of the sector to transmission.

\(^{12}\) The out-of-sector contacts and the public transport contacts represent the interface of the sector with the general population, which we define as the sector spread potential.
For the more relevant sectors, in terms of exposure and transmission potential, we also considered the data/information possibly available in the ECDC database and, combining also this type of information, we identified a draft list of new categories which could be considered in a new, enhanced, version of JRC Covid19 Database.

JRC and ECDC are currently developing a joint database, which they will maintain in cooperation. From the initial 6 categories of containment measures (i.e. “No mass gatherings”, “Non-essential shops closure”, “Flight restrictions”, “International movements restrictions”, “National movement restriction” and “Schools/universities closures”), we are planning to shift to 6, different, general categories, each one split into sub-categories, for a total of 97 records. The current draft for the new joint database with ECDC foresees the following general categories:

- Case management and quarantine
- Ensuring treatment capacity
- Hygiene and safety measure
- Social distancing
- Testing and diagnostic capacity
- Travel restrictions advice

Such new database is intended to serve the both, the needs of the analysis performed by JRC and ECDC, and it is also being designed for including as much as possible information useful for the ongoing developments about the tourism sector. This initiative would greatly benefit from the extension of the cooperation to FRONTEX, especially for the records regarding the travel advices which are so crucial for the tourism applications under development. Both organizations, JRC and ECDC, are open to such a development.

For the remaining gaps, the possible linkage with other relevant databases managed by other organisations should also be considered. For example, the initiative of WHO mentioned in paragraph 2.2 (Epidemiological analysis and risk assessment) would be a natural choice for a mutual fruitful exploitation of the strengths of both sides. In fact, WHO’s collaborative database is expected to bring together information on the interventions that have been introduced worldwide, already harmonizing the input of ten authoritative groups already tracking interventions. Hence, the new JRC COVID-19 database could be populated also using data from the WHO collaborative one and, at the same time, could contribute to it, with detailed data and information for the European region (see paragraph 3.6).

It is apparent that an optimization of efforts is needed in this domain, to avoid duplications and fill any potential gaps. Especially in this phase of the emergency, in which the granularity of the information needed, as well as the detail of it, is so deep that a full coverage by one or two organizations only is almost impossible. Moreover, the duration of the current phase of progressive lifting of the containment measures, and possible stepping back in case of new outbreaks of the disease, is expected to be long. And during this long-time span, the variety of situations possible in the different countries will be so high that only a collective effort can guarantee updated and reliable data at all times.

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13 Among which CDC, the University of Oxford, the Complexity Science Hub Vienna (CSH Vienna), and public-health organizations and non-profit organizations.
7 Conclusions and recommendations

This report describes the global framework in which the EU JRC measures database and COVID-19 epidemiological model are conceived. The JRC is continuously improving both to keep the results fit for use as an (internal) monitoring and/or early warning system at EU level in the coming months.

The availability of mobility data at national level has proved to be a valuable tool for monitoring the impact of the adopted infection containment measures on the national movements. For the development of an Early Warning, very preliminary tentative thresholds have been identified based on the combined analysis with COVID-19 daily data. JRC is in the process to acquire the Mobile Network Operator data, but unfortunately at the time of reporting, the coverage is not complete in most of the EU/EEA + UK countries.

Several institutions are working on collection of measures for different purposes. From this analysis clearly emerged the need for a coordinated strategy for the mid-long term for the collection of socio-economic data.

At this stage of the crisis, it is crucial to provide cross-sectoral analyses to capture the complexity of the COVID-19 situation as much as possible. To do that, the following “way forward” is proposed:

- A “learning-by-doing” approach which translates into a further refinement and adjustment of the JRC Covid-19 database on measures drawing on input and analysis centred around e.g. economic models and/or the work carried out by ECDC and the specific needs of the Commission (e.g. tourism and transport package). A certain amount of flexibility is in fact key, due to the dynamic situation of the Covid-19 crisis.

- A “joint effort” in the medium and long-term which entails linking the JRC database with other initiatives/databases. This would lead to at least two main benefits:

  1. Serving the scientific community in a better way by offering one authoritative source, instead of having a fragmented landscape
  2. Enriching internal analyses through the combination of several tools in one database with a common rationale and a specific purpose

The analysis of the data allows to point out the effect of the de-escalation processes going on in the various member states. The uplift of the first containment measures is clearly reflected on the mobility trends in all the EU/EEA countries analysed. The analysis of some countries that already started the lifting of restriction measures shows slight signals of reincrease or stabilization of the number of cases but not a marked increase, despite more than 3 weeks from the first uplift of the measures has passed, and the Lockdown mobility index clearly reflected the uplift. In the next weeks it will be possible to see clearer evidence of the lifting of containment measures.
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Integrated Situation Awareness and Analysis - ISAA Situation Report No 15

Integrated Situation Awareness and Analysis - ISAA Situation Report No 14

Michaela A. C. Vollmer et al., 2020 - Report 20 - Using mobility to estimate the transmission intensity of COVID-19 in Italy: A subnational analysis with future scenarios


Covid-19 situation monitoring and risk assessment platforms:

- WHO: https://covid19.who.int/
- London School of Hygiene and Tropical Medicine - monitoring dashboard: https://vac-lshtm.shinyapps.io/ncov_tracker/; interactive modelling: https://cmmid.github.io/visualisations
- Oxford Covid19 government response tracker: https://covidtracker.bsg.ox.ac.uk/
List of abbreviations and definitions

ECDC    European Centre for Disease Prevention and Control
SIR     Susceptible-Infected-Recovered, a class of epidemiological models
WHO     World Health Organization
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Annexes

Annex A. Monitoring of COVID-19 containment measures


Fig. 13 -Situation of implemented measures per type as of 27 April 2020 (source DG ECHO https://erccportal.jrc.ec.europa.eu/getdailymap/docid/3299).

Fig. 14 -Situation of implemented measures per type as of 5 May 2020 (source DG ECHO https://erccportal.jrc.ec.europa.eu/getdailymap/docid/3307).
Fig. 15 - Situation of implemented measures per type as of 11 May 2020 (source DG ECHO https://erccportal.jrc.ec.europa.eu/getdailymap/docId/3322).

Fig. 16 - Situation of implemented measures per type as of 27 May 2020.
Annex B. Lockdown mobility index

The different methodologies used by mobile data providers for analysing and categorising the data do not provide the possibility to directly assess the impact of the measures by a simple comparison of the data.

To overcome this limit and to understand the degree of lockdown for each country, a Lockdown mobility index has been developed, in order to compare the Lockdown factor based on non-pharmaceutical measures implemented by Member States (A. Annunziato, et al., 2020, a). The index is based on the change from the baseline, considered as a positive value:

\[
\text{Lockdown Mobility Index} = - \left( \text{Mobility data } T_1 - \text{Mobility data } T_{\text{baseline}} \right)
\]

With regards to the available datasets with different mobility categories, the following criteria has been applied to obtain the “Mobility data”:

- Google mobility data: the Google categories have been combined, by assigning a different weight (Table below). The weights for the Google categories are the same used for previous analysis (A. Annunziato et al., 2020 a) and are based on the comparison to the reduction factors (see Annex 3) in order to estimate how much each of the category is important to estimate the effective lockdown of a country from epidemiologic point of view).
- Apple mobility data: the average value of the 3 categories has been considered.

<table>
<thead>
<tr>
<th>Google mobility category</th>
<th>Weight factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail &amp; recreation</td>
<td>0,25</td>
</tr>
<tr>
<td>Grocery &amp; pharmacy</td>
<td>0,2</td>
</tr>
<tr>
<td>Parks</td>
<td>0,1</td>
</tr>
<tr>
<td>Transit</td>
<td>0,2</td>
</tr>
<tr>
<td>Workplaces</td>
<td>0,2</td>
</tr>
<tr>
<td>Residential</td>
<td>-0,05</td>
</tr>
</tbody>
</table>

*Tab. 5 - Weight factors for mobility categories*
Annex C. Reduction coefficients

In the analyses of the effect of lockdown, JRC implemented the reduction coefficients corresponding to the specific measure at the specific time. The weight assigned to each measure has been redefined according to the Tab. 6. It should be noted that the values of the individual coefficients have been chosen with engineering judgment and have been verified comparing the results with the mobility data and the report of the Imperial College (Ferguson, 2020).

JRC has also introduced a coefficient to distinguish the measures at “National level” from the ones at “Sub-National level”, as well as the two different enforcements: recommended or mandatory (see Fig. 17).

Moreover, the effect of a measure differs from country to country due to context-specific aspects which cannot be generalised. In the JRC estimation, the effects of these measures have been considered, but using the same coefficient for all the countries.

In the analysis of release of lockdown, the same factors should be added to the overall Rt. However, considering the use of social distancing and masks, only a fraction of increase of Rt in this second phase should considered.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools closure</td>
<td>0.2</td>
</tr>
<tr>
<td>National movement restrictions</td>
<td>0.3</td>
</tr>
<tr>
<td>International movement restrictions</td>
<td>0.05</td>
</tr>
<tr>
<td>Flight restrictions</td>
<td>0.05</td>
</tr>
<tr>
<td>Not essential shops closure</td>
<td>0.2</td>
</tr>
<tr>
<td>Events stop</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Tab. 6 - Contagion reduction coefficients
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