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Cities need to modify and/or adapt their urban form, the distribution and location of services and learn how to handle the increasing complexity to face the most pressing challenges of this century. The scientific community is working in order to minimise negative effects on the environment, social and economic issues and people's health. The three issues of the 14th volume will collect articles concerning the topics addressed in 2020 and also the effects on the urban areas related to the spread Covid-19 pandemic.

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The cover image is Rue de Rivoli - an emblematic street of Paris connecting Bastille to Concorde – that since May 2020 has been reserved for bicycles and pedestrians, Paris, France, Saturday, Nov. 6, 2021.

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REVIEW NOTES – Urban practices

Toward greener and pandemic-proof cities: policy responses to Covid-19 outbreak in four European cities

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Abstract
Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always following a rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is the expression of a continuous updating of emerging topics concerning relationships among urban planning, mobility and environment, through a collection of short scientific papers. The Review Notes are made of four parts. Each section examines a specific aspect of the broader information storage within the main interests of TeMA Journal. In particular, the Urban practices section aims at presenting recent advancements on relevant topics that underlie the challenges that the cities have to face. The present note provides an overview of the policies and initiatives undertaken in four global cities in response to the Covid-19 outbreak: Madrid (ES), London (UK), Milan (IT) and Brussels (BE). A cross-city analysis is used to derive a taxonomy of urban policy measures. The contribution discusses the effectiveness of each measures in providing answers to epidemic threats in urban areas while, at the same time, improving the sustainability and resilience of urban communities.

Keywords
Covid-19; Urban policies; Madrid; London; Milan; Brussels.

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1. Introduction

In December 2019, in the Wuhan province of China, a new form of Coronavirus (Covid-19) emerged. Since then, the virus has been spreading globally and, as of 05 October 2021, more than 200 Countries around the world have reported 271 million confirmed cases and a death toll of 5.32 million deaths (Template: Covid-19 pandemic data). The Covid-19 pandemic triggered both third and first world economies, causing severe disruption to society and business, especially in urban areas (OECD, 2020a).

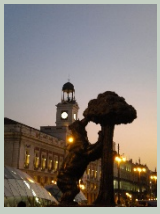
2. Toward greener and pandemic-proof urban areas?

Urban areas have been the ground zero of the COVID-19 pandemic, with 90 per cent of reported cases (UN, 2020). They are densely populated places where people live and gather, thus at high risk of spreading the virus due to the close proximity among residents and challenges to implement social distancing (Neiderud, 2015). These conditions have generated a large debate about the future role of cities in the post-Covid scenario. In this respect, some authors have argued that large urban areas are nearly defenseless in times of unprecedented disease outbreaks (Desai, 2020) and that dense urban settlements are not compatible with the needs of social distancing (Megahed & Ghoneim, 2020). These circumstances, coupled with increasing dematerialization of services and pandemic-pushed growing teleworking rates, have prompted some authors to questioning the ever-growing urban concentration model and envisioning a resurgence of rural areas as alternative and safer mode of urbanization in the post-Covid society (Cotella & Brovarone, 2020).

On the contrary, other authors have stressed the pivotal role played by cities in the Covid-19 response in terms of implementing nation-wide measures, but also in terms of providing laboratories for bottom-up and innovative recovery strategies (UN, 2020; OECD, 2020a; UCCN, 2020). Advocates of this second line of argument have seen in the Covid-19 crises an unpredictable opportunity to reshape our cities toward a greener and pandemic-proof urban future (OECD 2020a; Lai et al., 2020; Pierantoni et al., 2020). These optimistic claims are supported by a growing body of interdisciplinary research. Synergies, indeed, has been identified between policies aimed at providing answers to epidemic threats in urban areas and policies aimed at improving the sustainability and resilience of urban settlements (Garcia, 2020; Barbarossa, 2020; Pinheiro et al., 2020). Decentralization of public facilities, prioritization of soft over car-centric mobility, hierarchization of the transport system and public services, and redundancy of public, green and open-space functions have been identified as integrated measures able to achieve both public health and city sustainability targets (Pisano, 2020; Sharifi et al., 2020).

Within this context, the present short paper provides an overview of the policies and the initiatives undertaken in four major European Cities in response to the Covid outbreak: Madrid (ES), London (UK), Milan (IT) and Brussels (BE). This is followed, in paragraph 4, by a discussion on whether these measures are (or will) promote a sustainable urban recovery.

2.1 Madrid



Madrid is the capital and most populous city of Spain, with an estimated population of almost 3.4 million inhabitants. It is the second largest city in Europe and its influence in politics, education, entertainment, environment, media, fashion, science, culture, and the arts all contribute to its status as one of the world's major global cities.

Due to the pandemic crises, economic activity in Madrid suffered a strong setback of 9.6% in 2020, bringing its powerful growth of 3.6% in 2019 to a halt. The unemployment rate reached 14.03 percentage points, an increase of 3.83 points compared to the previous year. This slump in economic activity has caused income to fall in 37% of Madrid households to at least some extent.

To cushion the impacts of such an unprecedented situation, the City Council has drawn up in June 2021 the *Recovery, Transformation and Resilience Plan*. The plan seeks to make Madrid one of the best city to live and work in 2030 and has been developed, since its inception, in coordination with the 2019-2023 *Government Operational Program*, whose objective is to advance the social protection of the most vulnerable people, who have been especially impacted by the crisis caused by the pandemic, as well as to recover and stimulate the city's economic activity. The plan identifies 26

transformation challenges and includes a total of 105 investments with an estimated budget of 3.900 million euros. These measures, which are structured into 10 lines of action, constitute a catalogue of high-impact actions, in strategic areas, aligned with the 10 leveraging policies of the *National Recovery Plan*. For instance, the *City Renaturalisation* line of action is aimed at increasing the quantity and connection of urban green areas. This line of action addresses renaturalisation at three different scales: building, neighborhood and city, thus covering a wide variety of interventions ranging from the implementation of green roofs to the design of large urban green infrastructures. The most notable proposal under this line of action, due to its scope and expected impact, is a city-scale renaturation project with a wide time horizon, known as the *Metropolitan Forest* project. It will constitute a green infrastructure that will extend over 75 kilometers, and foresees the planting of up to 450.000 trees of native species. The *Sustainable Mobility* line of action promotes low-emission mobility and will involve the progressive adaptation of the city's infrastructures. Actions within this pillar include the extension of the city's network of bike lanes as well as the commitment towards the complete electrification of the city's bus fleet and the introduction of "green" hydrogen as a new sustainable energy vector. The *Urban Regeneration* line of action will carry out the urban rehabilitation of neighborhoods and degraded or aged areas, incorporating sustainability criteria, seeking to recover urban spaces and buildings. This line of action also aims at creating new centralities by following a polycentric city model to favor an urban balance and strengthen the quality of life in the neighborhoods. Service centers will be promoted in different areas of the city with special attention given to the neighborhoods hardest hit by COVID where the vast majority of interventions will be articulated. The *Resilient and Capacitated Children, Adolescents and Youth* line of intervention includes a number of actions finalized at supporting families and their most vulnerable members through education and training for employment. This line of action also addresses the reduction of the gap between men and women, while eliminating gender violence, through initiatives such as the following: i) equalizing the remuneration of men and women; ii) increase of women in managerial positions; iii) implementation of gender equality plans and iv) promotion of co-responsibility in the care of children. Finally, the plan identifies a series of different formulas for public-private collaboration, with the goal of increasing the capacity and efficiency of investments in projects due to the multiplier effect of mobilizing public resources jointly with the business and productive sector and the involvement of social agents, to achieve the challenges faced by the Spanish capital city.

2.2 London

With a population of 8.9 million inhabitants, London is the capital and largest city of the UK, the biggest urban economy in Europe and one of the major financial centres in the world. The pandemic has severely hit the city's economy that has witnessed a major recession in the course of 2020 with a GDP loss of 16.6% in Q2 2020 over Q1. Furthermore, the pandemic has further exacerbated pre-existing social inequalities, with low-income workers of colour, young adults, and women being the most affected social groups.

In order to address the challenges imposed by the virus outbreak, in June 2020, London's business and community groups have come together with the Mayor and leaders of London Councils to form the *London Recovery Board*, an initiative aimed at reshaping London as a fairer, more equal, greener and resilient city than it was before the crisis. The Board has identified a grand challenge that is "to restore confidence in the city, minimise the impact on communities and build back better the city's economy and society". Based on a participatory process that has involved over 63,000 Londoners, the Board has formulated 9 missions to help building the city back better. The latter has been lately included in the *London Recovery Programme,* a strategic document issued by the Greater London Authority in October 2020. The *High Streets for All* mission seeks to stich the essential uses of the city back together following decades of fragmented city planning to restore local neighbourhood functions. To this end, the mission includes a number of initiatives such as the redevelopment of vacant and underused buildings into productive use; the development of flexible and family friendly local work spaces; the restoration and the expansion of public space that will help support local small businesses, foster community ties and provide space for arts and culture. The *Green New Deal* mission is aimed at tackling the climate and ecological emergencies and improve air quality by doubling the size of London's green economy by 2030. To meet this target, a number of coordinated actions are envisioned, such as scaling-up programmes to retrofit and improve the energy efficiency of the existing building stock, and mobilising finance to support environmental programmes and provide support for the growth of London's clean tech and circular businesses. The *Helping Londoners into Good Work* mission is finalized at supporting Londoners entering into good jobs, with a focus on key sectors to London's recovery. Actions under this missions include: i) establishing sector specific London 'Academies' to support Londoners to gain relevant skills and move into good work in digital, health, social care, green economy, and creative and cultural industries; ii) coordinating skills, careers and employment and ensuring that employment and enterprise provide a secure route out of poverty and iii) attracting international investments in economic sectors that are considered key to London's recovery. The *Healthy Food Healthy Weight* mission aims to ensure that all Londoners have access to healthy food within an environment that supports them to maintain a healthy lifestyle. Actions under this pillars are thus target at: i) increasing physical accessibility to healthy food by offering incentives and encouraging the establishment of farmers' markets and ii) promoting physical activity by improving walking and cycling conditions as well as expanding urban green areas. The *Digital Access for all* mission is aimed at ensuring that every Londoner have access to good connectivity, basic digital skills and the devices or support they need to be online by 2025. To meet this target the city of London has launched a number of initiatives, such as the *DevicesDotNow* and the *Good*

Things Foundation network that have distributed thousands of devices to continue learning online to both year 10 pupils and adult learners. Furthermore, under this mission, the city is in the process of developing a long-term strategy for the implementation and maintenance of a modern and efficient 5G network, in collaboration with the agents of the sector, which will facilitate both the deployment of 5G infrastructures in significant municipal spaces and the development of standardized technological solutions.

2.3 Milan

Whit 1.4 million inhabitants, Milan is the second largest city in Italy. As the capital city of the Lombardy, one of the wealthiest EU regions, Milan is considered a leading alpha global city, with strengths in the fields of the finance, commerce, art, design, fashion, media services, research and tourism.
On February 21st 2020, the first Italian Covid-19 case was registered in Codogno, a small town about 50 kilometers south of Milan. Since then, the virus has spread over the Lombardy region, making Lombardy and its capital the focal point of the virus outbreak in Italy. The pandemic has severely hit the city's dynamic economy and social life, reversing the long-standing growth trends that have characterized its economy, with consulting services, finance, constructions and horeca being the most affected economic sectors. In order to provide a response to the social and economic challenges posed by the pandemic, on May 4th 2020, the city Council launched *Milan 2030,* the city's adaptation strategy to the Covid pandemic. The document was first released as a draft in early April 2020, open to observations and contributions through an online participatory process. Central to the adaptation strategy is the idea that the pandemic is generating long-lasting radical changes in citizens lifestyle and business operations and that these changes will require a strong reorganization of the city's physical and organizational assets. Therefore, city's reorganization should not merely provide a short-term operational response, but should also set the condition for improving city's readiness and resilience to current and future critical situations that could occur in the mid and long term. The first part of plan provides an analysis of the social and economic impacts of the virus outbreak. This part serves as the plan knowledge-base to set a future vision of the city. The vision encompass 5 main guiding principles in the fields of governance, economic development, public services, workforce and sustainability. Based on such principles, several planning and revitalization interventions are defined. One of the most important line of intervention concerns with the reallocation of the uses of roads and public spaces with the main objective to increase soft mobility supply and develop areas that allow commercial, recreational, cultural, and sporting developments, while respecting the appropriate physical distances. In this respect, the adaptation strategy envisions the development of 35 km of new bicycle lanes, the re-development of city's pedestrian paths, with new and widened pavements, and the extension of Limited Traffic Zones and pedestrian areas. On the land use side, interventions have been target at strengthening public services with attention to proximity, ensuring access within a 15-mininutes walk to essential services, balancing the differences between neighborhoods, enhancing specificities, and trying to reduce inter-district travel. Accordingly, the Municipality of Milan is cooperating with the Lombardy Region to create local services, starting from popular neighborhoods, with high population density and characterized by an older population. Other strategic lines of intervention included the adaptation of the city's Time and Hours Plan to a different schedule for public services especially for social and educational services and productive activities, in order to avoid overlaps in entry and exit times, regulate the demand for mobility and facilitate physical distancing, identifying timeslots reserved for the most vulnerable groups. A further line of intervention concerned with the simplification, expansion and acceleration of digital services available to the citizens in order to reduce the needs to travel and contain physical contacts between public servants and city users. Finally, the plan intends to support both business and household economic recovery by providing e.g. microenterprises financing services, social rental services and facilitated access to credit. A dedicated section of the strategy is also devoted to skills redevelopment, targeting individuals that have lost their jobs due to the current crises.

2.4 Brussels

Brussels — officially the Brussels-Capital Region — is a region of Belgium comprising 19 municipalities, including the City of Brussels and has an urban population of 1.2 million inhabitants. It grew from a small rural settlement on the river Senne to become the de facto capital of the European Union, as it hosts a number of principal EU institutions, including the European Parliament, the Commission and other administrative, legislative and executive EU institutions and agencies. As one of the top financial centers of Western Europe, it's economy is largely service-oriented and dominated by regional and world headquarters of international companies though it still does have a number of notable craft industries. Brussels have been severely hit by the Covid pandemic with consultancy, horeca and commerce being the most affected sectors. More than one in four workers have been put on temporary unemployment since March 2020, while the city GDP is expected to shrink by 8% this year. Furthermore, the effect of the pandemic has also been felt unequally in Brussels, where infection rates have been two or three times higher in poorer, cramped neighborhoods than in richer, greener ones.
In contrast with the cities of Madrid, London and Milan that have articulated organic city adaptation responses, Brussels response to the Covid-19 has been relatively fragmented and characterized by a number of sectoral policies regulating

different aspect of the urban life. These measures have been issued by the City Council between March and October 2021, targeting specific policy domains such as mobility, social welfare, land uses and public services. In particular, measures in the mobility domain have been the focus of the city administration. When confinement was imposed on 19 March, the immediate priority of Brussels authorities was indeed to encourage social distancing by giving more space to cyclists, pedestrians and shoppers. In this respect, the city started the construction of dedicated bike lanes in the capital – infrastructure that has been increasing in recent years but still lags behind cities in Flanders, the Netherlands, and Denmark and elsewhere. In particular, from May to November 2020 over 40 kilometers of new, dedicated cycle paths were developed. Even Rue de la Loi, one of Brussels' most congested streets that snakes past the Belgian parliament and the European Commission headquarters, got the bike lane treatment in May. Dedicated bike lanes and fewer cars on the road has led to an explosion in bike use – up 44% on the previous year in early September. Another important measure in the soft mobility domain concerns the extension of pedestrian areas in the historic city center. Since September 2020, the so-called "Pentagon" area has been divided into different residential areas where quality of life and safety are priorities and where the maximum speed of 20 km/h is maintained. In this way, the city created more space to respect the physical distance rules. The City of Brussels has decided to adjust this temporary measure in order to be better suited to residents and traders, but also commuters, visitors, customer. A participatory process has been also launched in September 2020 to review the impact of the adopted measure and to ensure that all city users are heard in this project.
The city has devoted increasing attention to the recovery of commercial, leisure and horeca activities and has developed in May 2020 a dedicated recovery plan. Beside financial aids and incentives, bars, restaurant and café have been allowed to expand their terraces onto sidewalks and even close roads in some areas. Finally, the city has created a special structure, the Social Action Unit COVID (CSAC), to assist the inhabitants of Brussels who were materially, financially and psychologically affected by the Covid-19 crisis.

3. Discussion and conclusions

As Covid-19 spreads across the world, cities have become epicenters of the pandemic, amplifying the spread and transmission of infection, with their dense population and transport networks. At the same time, cities have become catalyst of sustainable recovery. Many examples of good practices taking place in cities across the word are captured by dedicated and constantly-updated reports of international organizations such as WHO (2020), UN (2020) and OECD (2020a) and UCCN (2020). This contribution provided a focus on European cities and examined policy response to the Covid-19 epidemic in a sample of four representative urban areas. A cross-city analysis of measures implemented in the cities under investigation can be a useful exercise to derive a taxonomy of urban policy measures. This is reported below, together with some considerations on the effectiveness of such measures in providing answers to epidemic threats in urban areas while, at the same time, improving the sustainability and resilience of urban communities. Considering the social, the physical and the functional subsystems composing the city, measures could be addressed to:

3.1 Physical subsystem

- *Expansion of cycling infrastructures*. Cycling is promoted by many cities as a recovery strategy since it can reduce pressure on crowded (and often depotentiated) public transport while allowing citizens to respect social distancing, thus lowering the risk of virus transmission. Especially in dense urban settlements, as those exanimated in this article, where commuting distances are compatible with the use of bike, cycling represents an alternatives solution to provide citizens with essential needs, go to work when necessary, and still perform some physical activity, even in times of pandemic outbreaks (Garcia, 2020). At the same time, the promotion of cycling in urban areas represents an essential ingredient to improve cities livability and reduce the externalities of car-oriented urban development (Ison & Shaw, 2012).
- *Improvement of walking paths/ expansion of pedestrian areas*. These measures can be considered effective tools to promote sustainable mobility while, at the same time adapting the city physical environment to the new challenges imposed by the virus outbreak. On the city sustainability side, these measures can contribute to sustainable mobility targets by shifting mobility demand from private cars to active transportation modes (Li et al., 2014). On the health side, ameliorate walkability has been

demonstrated an effective tool to improve public health by promoting physical activity (Frank et al., 2006). Furthermore, extension of pedestrian areas and sidewalks can guarantee enough space for safe physical distancing while favoring business reopening by accommodating longer lines deriving for lower business accommodation capabilities (WHO, 2020).

- *Extension of green and open space functions*. Environmental benefit of public, green and open spaces are well-established: they contribute to the purification of water and air climate, to the regulation and mitigation of the urban climate, and support biodiversity conservation (Chiesura, 2004). Following the pandemic outbreak, researchers have found that the virus transmission spreads more easily indoors than outdoors (Morawskaa & Caob, 2020) and that urban green urban spaces have been crucial for exercise and mental wellbeing during the stringent lockdown (Razani et al., 2020). Extension of these areas represents thus a valuable contribution to foster city sustainability while, at the same, time providing concrete spatial planning answers to epidemic threats.

3.2 Functional subsystem

- *Decentralization of public facilities*. Decentralization of public facilities is considered a fundamental property to contain the spread of the virus since it allows people to be able to get the goods and facilities they need within the minimum distance from their houses, thus limiting the interaction with the other sectors of the population (Pinheiro et al., 2020). Furthermore, the decentralization of healthcare services can reduce the response time, and saving operating costs (Pisani, 2020). A balanced juxtaposition of homes and services, is thus not only a well-known urban planning strategy to reduce long-distance trips and promote active transport, but represents also an emerging tool for containing epidemic spreading.
- *Improvement of IT infrastructures and digital services*. These measures can generate positive co-benefits: the digitalization of public services can indeed reduce the need to travel while at the same time contain physical contacts between public servants and city users. Furthermore, IT technologies can also provide a fast and concrete response to citizen's needs. Investments in this domain should be thus certainly encouraged in the context of city's recovery plan.

3.3 Social subsystem

- *Households / small business economic support.* The pandemic crises has exacerbated the existing social inequalities while severely affecting cities economy. Measure aimed at provide households economic, social or rental support as well as measures target at provide relief to most affected economic sectors have been implemented in all cities under investigation. While undoubtedly necessary, these measure, if not integrated in a wider urban economic recovery strategy, can be considered only effective in the short term. Their impacts on cities sustainability and resilience is hard to demonstrate.
- *Human capital development*. According to OECD (2020b), the global pandemic is triggering substantial changes in the labor market. Accordingly, it is essential for governments to help workers transition to the post-Covid 19 economy. These measures are highly recommended by international organizations as they provide the ground for fostering citizens' resilience to current and future disruptive events.

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Image Sources

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