EMERGENCY STRATEGIES FOR CITIES.
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Over the past centuries, urban and building codes have been shaping cities in order to reduce the risk of natural disasters. Nowadays, cities are the sum of different strategies in terms of disaster prevention as fire, flood, earthquake and epidemics. Basically, any emergency management is divided in four phases: mitigation, preparedness, response and recovery. In current COVID-19 outbreak, we're in the response phase.

The main objective of these strategies is to reduce or eliminate the risk to human life and property from hazards. Mitigation or prevention phase can be considered as a key factor in any disaster management, since it can reduce the impact in subsequent phases as preparedness, response and recovery. Commonly mitigation strategies include the application of building codes, elevating construction in flood areas, designing structures to resist earthquakes or avoiding any building in landslide zones.

Cities and natural disasters.

After the Great New Orleans Fire in 1788, which destroyed almost entirely the French Quarter, and the later Fire in 1794, new local regulations tried to reduce the risk of future fires. The wooden buildings were replaced by others more resistant to fire, as masonry structures with stones or thick brick, and most of the new buildings were designed with courtyards, arcades and iron balconies. In this regard, fire prevention has been shaping the French Quarter as we know it today.

At that time, fire protection wasn't a public right to all citizens. Firefighters will exclusively attend buildings, which have a proof of insurance. The first insurance companies started to protect the buildings in case of fire after The Great Fire of London, in 1666. Policy holders received a badge that it was fixed to the main façade, in a clear position, so the firefighters looked to the mark in order to give protection. Badges were different depending on the insurance company, and sometimes building were left to burn until the right fire company attended.

In 1824, Edinburgh was the first city to establish an organized municipal fire brigade. Nine years later, the same Chief Officer of Edinburgh, James Braidwood, founded in London the Fire Engine Establishment. Thus, London had to wait 167 years after the Great Fire of London in 1666, to consider fire protection as a public right to all citizens. Nowadays, every city in the world has a municipal fire department.

Fire protection codes have been shaping cities and buildings over the years and centuries. Most of the times, after a fire, the codes and standards are reviewed and if necessary, they're transformed or replaced by new ones. The recent Grenfell Tower fire in West London on 14th June 2017, was the deadliest fire in Britain in more than a century. It caused 72 deaths and more than 70 others were injured. The fire spread rapidly through the building facades, due to a recent renovation with cladding panels with a core of flammable materials, which accelerated the fire through an interior cavity. In the 2021 International Building Code the fire safety of facades is being revisited, following the Grenfell Tower tragedy.

Most cities, as New Orleans, have been shaped by emergency management strategies, from long-term to short-term actions. Long-term decisions after catastrophes, include how urban planning and architectural design can reduce its future risks. When Katrina Hurricane hit New

Orleans, in late August 2005, 1.833 people were killed. It was the most destructive storm to ever strike United States.

The storm consequences were an accumulation of mistakes, some of them due to wrong regulations in urban and regional planning and others due to post-catastrophe management failures. New Orleans' levee system was eroded and incomplete when Katrina hit, with almost 61 centimeters below its original elevation due to the result of unstable soils. Additionally, Louisiana wetlands, around New Orleans, are a natural buffer against hurricanes, reducing significantly the water speed. This natural protection against flooding has been decreasing in size over the last century, due to a lack of preservation and protection in regional planning regulations. In this regard, the city's pump stations weren't prepared to drain so much water and the wetlands natural buffer wasn't helping as they used to.

Furthermore, the public transport wasn't ready to evacuate its residents and those with private cars had to wait long delays, without the possibility of refueling. There was a lack of coordination between city and state authorities, hospitals and shelters.

Thus, Katrina's catastrophe wasn't the result of one mistake, but the sum of many wrong decisions, from prevention to post-disaster actions. To face the problem, we need to see the big picture, by looking not only to New Orleans while to the whole region, from Louisiana wetlands to the Gulf of Mexico, from water protection to evacuation and communication. We can learn from these errors in order not only to reduce its future risks, while to seize new opportunities.

New Orleans's post-disaster strategies were focused in many different layers. On the one hand, the city's levee height has been increased and replaced when required, and on the other hand a new evacuation and alert system called *NolaReady* has been implemented, to inform residents via email and text messages. Furthermore, it was created the Coastal Protection and Restoration Authority in order to preserve Louisiana's wetlands.

In addition to emergency management strategies, New Orleans has seized the opportunity to transform the city with new projects not related directly with disaster prevention. The new *Biomedical Center* in downtown aims to transform the city's economy, away from tourism and shipping, while the *Musicians Village project*, formed by a Music Center and 72 houses to accommodate New Orleans' Musicians, was funded by the New Orleans Public Schools, philanthropic donors, musicians and two local communities.

Cities and epidemics.

In a similar way than fires or flooding, epidemics have been shaping our cities over the years. The *miasma* theory, accepted from ancient times, related the spread of specific diseases as cholera, yellow fever or tuberculosis with the *bad air* coming from rooting organic matter. It was believed that diseases floated through the air and water. Although this theory was replaced at the end of XIX century by the germ theory of disease, it helped not only to remove the waste from cities, while to provide healthier buildings and public spaces.

Historically, cities were an incubator of disease. During the industrial revolution, people looked at densely populated cities with the fear of catching the *bad air*. One of the greatest achievements of urban planning and design was to build healthier cities without the terrifying *bad air.* The buildings were designed with better sun orientation and ventilation, and the sewage system together with the waste collection helped to avoid the spread of diseases.

In some way, tuberculosis pushed cities to have more open spaces and better orientation. The sunlight and fresh air were very curative, so buildings and cities were designed to fight tuberculosis. At that time, hospitals used to assembly tents in their exterior to ensure patients with tuberculosis, get better sun orientation and fresh air. In this regard, it's fair to say that tuberculosis helped to understand the high value of good orientation and ventilation.

In a different scale, cities started to design parks to have more open spaces, which helped to get better sunlight and fresh air. In 1858, when the *miasma* theory was still around, the American landscape architect, Frederick Law Olmsted, won the competition to design the Central Park in New York. Although, there wasn't a scientific evidence about the *bad air*, it was well-known that fresh air made healthier cities. Olmsted knew that cities needed open spaces to breath, and these spaces should be accessible to all citizens. He defended the idea of Central Park as a *public park,* against any private interference, which at that time it wasn't considered as a right for all citizens. After designing Central Park, his great social commitment led him to be appointed as Executive Secretary of the Sanitary Commission, a precursor to the Red Cross, which helped the wounded during the American Civil War.

Once that the *bad air* was removed from cities, densely populated urban settlements weren't a problem anymore, in terms of the spread of diseases. Urban design and planning played an important role to reduce the risk of epidemics, and to win the battle against cholera or tuberculosis. It was a battle fought in many different fields, as the sewage system, the waste collection, the sun orientation, the ventilation, the public parks and open spaces, among many others.

Today, compact cities are not anymore, a synonymous of diseases, as it was during the Industrial Revolution, although we still have the *bad air*, as the environmental pollution, including air, water and food. Nowadays, we still have the challenge about making healthier cities, by reducing the risk of future diseases.

Cities and COVID-19.

The recent pictures of workers with yellow suits and masks disinfecting cities in China, has put again the eye in cities as a potential accelerator to the spread of diseases. COVID-19 has found cities as the best place for reproducing, due to the high possibility of contagious. The virus is not only in the air, but it also can live in the asphalt and it can be brought home in the sole of a shoe. Density has been a key factor for sustainable cities, due to the efficiency of public infrastructures, but now with COVID-19 compact cities have the highest rates of infected patients.

In addition, COVID-19 cannot be fought exclusively from one city, as in the cases of other disasters as fire, flooding or diseases as cholera. It has become a global pandemic which requires coordinated action between cities, countries and organizations. Hurricane Katrina showed the negatively impact of the lack of coordination between public authorities and citizens, during the evacuation of New Orleans. *NolaReady* is a simple information tool which can help to coordinate different actions, just by using the potentiality of a smartphone, by linking citizens with public authorities in real time. This alert system is already implemented in many cities, counties or states and can be a powerful tool for fighting COVID-19. It would be possible to track all infected or potential patients, as well as to provide the right scientific information and share the recommendations to reduce the risk of contagious. In the near future, it'd be possible to share information about our health condition, as many apps already do. Obviously, there's a conflict with privacy, that must be considered in cases of pandemic.

Singapore has shown the importance of public health communication, to reduce the spread of COVID-19. A national WhatsApp with only one-way messaging delivers information from the public authorities to its citizens, avoiding the overwhelming amount of information and fake news through other channels and social media. Singapore built a task force involving different government agencies to coordinate future pandemics, which were essential to stop the spread of COVID-19, thanks to the cooperation between Singapore Police and the Ministry of Health, to determine the contacts and links of those infected with COVID-19. These procedures were developed after SARS outbreak in 2003 and now they have proven to be effective and necessary.

COVID-19 compared to any other pandemic, has been spreading rapidly. Before, the speed of contagious was determined by the speed of a horse, while today, by plane, in 24 hours the virus can reach to any city in the world. In this regard, the preparedness phase has been very short, with almost no time to take actions. The good news is that today we also have real time information systems, which could monitor the global movement of the virus.

The lockdown in certain cities around the world has brought images of empty cities, like Paris or Venice without any tourists. This quarantine is bringing a potential economic crisis, while some benefits as a global CO_2 reduction for the first time since 2008. In addition, telework, home office or on-line learning have arrived to stay with us, even when COVID-19 outbreak finishes. Homes must incorporate these new functions, as part of its traditional program. Telework will become an interior housing activity, as today cooking, sleeping or taking a shower already are.

Emergency life cycle.

Resiliency is the factor which define the adaptive capacity of a city. Personally, I prefer to use the term evolution rather than resiliency. While the latter is the capacity to recover from crisis and to return to pre-crisis status, evolution is an open process not only to recover from crisis, while to create new opportunities, through a balance between the past and the future. Adaptation is just one of the options of an evolutionary process.

Now it's the time not only to respond to COVID-19 pandemic, but also to start thinking on how to recover and be prepared for the next pandemic. The four phases of emergency control, *mitigation, preparedness*, *response* and *recovery*, should be handled as the management of a continuous life cycle. The final goal is to reduce or eliminate the impact of any type of emergency in all the phases of the disaster life cycle.

During outbreak of COVID-19 many cities have built new hospitals or have reused existing facilities as fairgrounds, to accommodate an increasing number of patients. There's a lack of beds and medical supplies, since the health care system is not dimensioned to support so many cases in a short period of time. To fight against flooding, city's drainage system is oversized, to be prepared for the inundation flow, while most of the time they only evacuate a small proportion of water. To oversize pipes and drainage systems is not a big cost, while building hospitals it is. Rather than building more hospitals to be ready for the next pandemic, it would be possible to establish a network of beds formed by hospitals, clinics, hotels, elderly homes and provisional health facilities, which could accommodate different patients according to their illness condition. The beds must be in close distance to hospitals, so it's easier to manage the flow of patients. The first step is to draw a map, representing the number and type of beds around hospitals. Once that we know the amount and type of beds available, around each hospital and clinic, we 're in the position to decide if we need more or not. In case we need it, urban planning can support the construction of new hotels or elderly homes, providing benefits in terms of tax reduction or amount of beds. If necessary, the network of existing hotels or

elderly homes around hospitals, should be renovated to adapt to specific health requirements, with no cost for the owners.

This network of beds will be activated in case of epidemic or other type of emergency. The design and construction of the network must start as soon as possible, and it's just a small part of a broader emergency strategy. It's a key factor to create a task force including different type of professionals as doctors, epidemiologists, data and software engineers, app developers, communication specialists, urban designers, architects, economists, among many others. The task force will start working in the recovery of COVID-19 and in the preparedness for the next epidemic or emergency.

Pre COVID-19, global warming was a huge challenge and a main priority. Now, we're also facing the threat of pandemics. Both need to be addressed simultaneously.