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Author:	Astrid Piber, Partner/Senior Architect, UNStudio
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Megacities vs. Urban Sprawl; Densifying vs. Social Distancing



Astrid Piber

Author

Astrid Piber, Partner/Senior Architect UNStudio Stadhouderskade 113 PO Box 75381 1070 AJ Amsterdam The Netherlands t: +31 20 5702040 f: +31 20 5702041 e: a,piber@unstudio.com unstudio.com

Astrid Piber is a partner at UNStudio and senior architect in charge of several large-scale design projects globally. Piber's trans-scalar approach—from large-scale mobility projects to custom-crafted interiors—connects human-centered design with planet-centered implementation. In projects such as the Arnhem Central Station master plan and the Raffles City mixed-use development in Hangzhou, China, the interdependency of functional, economic, and future-proofing criteria has led to building organizations that go beyond segregated typologies.

66The argument that cities are 'bad for people's health' is not new, and pandemics throughout history have resulted in the development of new infrastructures and planning regulations.**99**

Abstract

Decentralization and the "15-minute city" are ideas that are currently being put forward to tackle urban challenges, but how will these issues be tackled in the design of tall buildings? What is the implication for these ideas in a future, pandemic-aware context? Can future vertical expansion be addressed through new models that take into account the same multiple and complex challenges currently being faced in the horizontal realm? It is time that we stop understanding vertical development in terms of autonomous single-program buildings, and instead approach it as the holistic extension of multiple urban systems along the vertical axis.

Keywords: Densification, Megacities, Social Distancing, Sustainability, Urban Sprawl

Learning by Doing

While different parts of the world experienced second and third waves of the coronavirus pandemic, in the fields of urban design and architecture, questions surrounding the future-proofing and sustainable development of our cities gained increasing momentum. The world remains in a state of flux; governments have implemented different policies and regulations locally and globally; and developers and investors have adjusted their business models towards an unknown future. How do we go about designing for these new dynamics as architects and planners? Currently, the whole world is "learning by doing," which is a unique, simultaneous experience. On the one hand, we have seen knowledge exchange about planning issues taking place in newly transformed global online conferences, and on the other hand—in our direct physical environment-we are witnessing bottomup initiatives transforming our environment, alongside immediate measures that may fail or succeed. Clearly, the ecosystem of life, urban development, and growth as we have known it has been turned on its head by the pandemic.

It is commonly understood that three key drivers—the introduction of new codes and

regulations, the call for a holistic approach to sustainability and the increased incorporation of technology—will play significant roles in how our cities develop in the near future. In the following paper, we will touch upon these drivers and further investigate the future of urban densification in light of the challenges brought about by the coronavirus pandemic, and what this may mean for the vertical expansion of our cities post-COVID-19.

Pre-COVID Assumptions

Prior to the COVID-19 crisis, we expected an increase of 2.5 billion people to move or be born into in the world's urban areas by 2050. The physical densification of our cities, whether outwards or upwards, was already considered an inevitability, and this projected densification had placed significant pressure on city planners.

In fact, forecasts have stated that in 2050, two-thirds of the world's population will live in urban areas (UN 2018). This growth presents enormous challenges to our cities environmentally, socially, and economically. In order to prepare for this widespread future densification, cities have already accepted expansion in one form or another. Providing adequate means to serve the needs of growing urban populations has particularly referred to providing transportation, energy systems, and housing, but also to offering employment and services, such as education and healthcare. The increasing number of people who continue to migrate to cities in search of work, better housing, and improved quality of life does not show signs of abating in general, especially in the world's largest megacities (see Figure 1).

Prior to the current pandemic, city planners and policymakers did not see the concentration of so much population and economic activity in a few larger centers as the preferred solution. The debate around megacities focused on the balanced distribution of activities between megacities, primary cities, and secondary/tertiary cities, and the fact that megacities as "economic engine rooms" have become more and more unaffordable, thereby creating a societal gap with smaller cities or more rural regions.

However, if we are not only looking at megacities, but at urban areas in general, then from an economic perspective, prior to COVID-19, densification as such has surely been seen as a positive development, and as an improvement to the lives of many people, with cities acting as social and economic drivers. Cities enable people to live in close proximity to one another, to interact, to create a sense of community and avoid social isolation. City dwellers can reach everything they need within a short space of time, and without the need to commute long distances. Younger generations in particular appear to value the proximity that city life offers, in contrast to living in the suburbs or more rural areas.

If those cities now feel less safe following the rapid spread of a virus, will the topic of densification be less pressing post-COVID-19? We would argue that it will remain an important challenge for as long as cities continue to offer economic, social, and cultural benefits that cannot be found elsewhere.



Figure 1. The trend of mass urbanization is not expected to abate significantly; however, adaptations will need to be made for the new post-pandemic reality. Provision of green space will be essential, at minimum, at the bases of towers. Shown here: Daegu Wolbae iPark, Daegu, South Korea. © Rohspace

Is Densification a Threat to Public Health?

Through the COVID-19 lens, inner-city densification can certainly now be seen as a threat to public health. However, disaggregation and separation to avoid transmission of the virus is spatially oppositional to the concept of concentrating our cities in order to drive energy efficiency and minimize sprawl. Social distancing was the primary preventive measure used to fight the spread of COVID-19 all over the world. If we continue to densify our cities, are we then creating an additional health threat for those living in large urban communities?

The argument that cities are "bad for people's health" is not new, and pandemics throughout history have resulted in the development of new infrastructures and planning regulations.

As cities grew during the Industrial Revolution of the 18th and 19th centuries, they became dirtier, more polluted, and unhealthier. In the 19th century, London was the world's largest city and was renowned for its smog, comprised of the toxic, coal-generated air pollution that had shrouded the city for centuries. However, during the cholera pandemic in London, public health was threatened not by polluted air, but by polluted water, due to overflowing sewers. By moving the main pump further up the River Thames, the water company was able to provide the city with cleaner water. The city's waste started to be transported out of the city, and the muddy embankments of the Thames were replaced with public infrastructure and urban greenery.

Similarly, the 19th-century cholera pandemic hit New York City particularly hard, until city leaders responded to the outbreaks by banishing 20,000 pigs from the heart of the city and constructing a 41-mile (66-kilometer) aqueduct system that delivered clean drinking water from north of the city. Planning for Central Park, designed by Frederick Law Olmsted and Calvert Vaux, began in the immediate aftermath of New York's second



Figure 2. People- and planet-centric technology will need to be integrated into future cities. Shown here: concept plan for a circular economy at Brainport Smart District, Helmond, Netherlands.

cholera outbreak. Landscape architect Olmsted advocated for the healing powers of parks, which he believed could act like urban lungs as "outlets for foul air and inlets for pure air."

Concluding from these historic anecdotes, one could say that humankind is inventive in counteracting such threats, and that throughout history we have been successful in incrementally making the cities we live in "healthier" places. Whether COVID-19 will require us to plan for better urban infrastructure and/or more green public spaces remains to be seen, but while both measures would perhaps be a first step in the right direction, they would not be sufficient in themselves (see Figure 2). In the face of continued densification, and in the battle we are currently facing against the coronavirus pandemic on a global scale, we are having to look far beyond merely implementing new rules and regulations for our cities and buildings. In order to reduce the risks of outbreaks, changes to routines and behaviors are also required, along with vaccines and the use of innovative technologies.

Learning from the Recent Past

During the coronavirus pandemic, some of the world's largest megacities—Shanghai, Seoul, Shenzhen, and Tokyo, to name but a few—took verv strict lockdown measures. and their transmission rates remained comparatively low to those in other parts of the world. It was also possible to minimize outbreaks of second and third waves of the pandemic through the introduction of strict guarantine measures and monitoring. In countries like China, migration to megacities appears to be continuing. The national economy is sufficiently strong, and the cities and their economies returned to nearnormal after their initial lockdown. Yet there is still uncertainty, as the fight against the global pandemic remains a collective effort, and vaccination levels differ considerably in different parts of the world (Liang 2020).

In general, affected municipalities and governments across the globe implemented policies to limit the denser areas of cities from becoming a threat to public health. However, inequity of populations, scarcity of space and a lack of affordable places to live

put these policies to the test, as overcrowding necessitates that homes be shared by large numbers of people. Research has shown that the coronavirus spreads faster when large numbers of people share one home and, as a result, many of the world's megacities underwent exponential rates of transmission. In India, nearly 50 percent of the active COVID cases in June 2020 were reported from the three megacities of Mumbai, Delhi, and Chennai, which house some of the world's largest slums, and where, next to the hygienic constraints of drinking water and an overload of waste, the required area in which to socially distance is non-existent (Besra et al. 2020).

Better urban management and inclusive urban planning policies could improve the living conditions for slum dwellers and others living in cramped conditions. However, as this raises further questions pertaining to social sustainability, inclusivity and diversity, it is as much a policy issue as it is a planning problem. That having been said, the recent pandemic has demonstrated that—also in order to protect the population of the city as a whole-if the migration of people from rural environments to urban industrial sectors continues to be pushed economically forward, this needs to be facilitated adequately. Viable and affordable new development models need to be created in order to ensure that basic human needs are met, and adequate housing and urban infrastructure are provided.

Opportunities for a Sustainable and Resilient Future

During the battle against the pandemic, questions surrounding how we can live, work, and play in the healthiest ways led to many assumptions about the future of the workplace and of flexible living, with many new alternative models being proposed. Mobility is also one of the biggest sectors directly affected by the pandemic, from public transport to the distribution of goods, and is certainly vital on both the local and global scale. Particularly here, and in how our cities are managed—from logistics infrastructure to food and waste chains-the integration of technology can have a significant impact on improving how we design and manage our city's infrastructure and mobility. Furthermore, if we improve the integration of these facets with all other functions in the city, we can begin to introduce a polycentric city model, comprising the much-promoted "15-minute city" concept. "Everyone living in a city should have access to essential urban services within a 15-minute walk or bike," according to the mission statement of the 15-Minute City Project. "This is designed to help access-focused urban transformations be what we need them to be: ambitious. inclusive, measurable, and effectively implemented" (Luscher 2021).

Taking these aspirations as a starting point, the solutions required in the future to address the sustainable densification of cities need to be different from those we know now. They need to be both people- and planet-centric (see Figure 3). Changes in the field of sustainability will occur through the implementation of new regulations and the impact of innovation from technologies. The cultural and traditional aspects of the context in which our cities are embedded, alongside new governance models, will determine the microeconomics of a place and its ability to thrive.

The "circular economy" presents a viable alternative to our unsustainable status quo; promising to reduce our environmental footprint, while at the same time boosting the competitiveness and livability of our cities. If we take Amsterdam as an example of a city that strives to be fully "circular" by 2050, then the tool implemented to achieve this transformation is the "doughnut model," coined by Kate Raworth (2017). This ambition will require us to look at how logistics are organized, where food comes from, how we manage our waste, how the city relates to its immediate surroundings, and how the vital functions of the city are dispersed and yet accessible to all (see Figure 4). It will require new ways to assess how the city works, and the creation of flexible spaces and typologies

within the city. Mobility in the city should favor non-polluting modes of transport, while green and public spaces become the city's vital lungs.

New Models for Vertical Expansion

Decentralization, inclusive planning strategies, the "15-minute city" and the "doughnut model" are ideas that are currently being proposed to tackle today's urban challenges. But how do all of these strategies apply to tall buildings? We believe that the vertical expansion of our cities should be understood in terms of the same multiple and complex challenges currently being faced in the horizontal realm. Is it not time that we stop understanding vertical development in terms of autonomous single-program buildings, and instead approach it as the holistic extension of multiple urban systems along the vertical axis?

A number of years ago, Ben van Berkel, founder of UNStudio, coined the phrase "vertical neighborhoods," referring to the potential for tall buildings and mixed-use projects to mirror the variety of programs, residence types, amenities, and public spaces found in traditional cities; to view



Figure 3. No matter the scale of the city in question, humans' relationship to the food we consume will need to be closer, even if mediated by more technology. Shown here: Rendering of Brainport Smart District, Helmond, Netherlands. © Plomp

66The pressing issues generally affecting our cities also apply to tall buildings, from infrastructure and mobility, to program mix, to sustainability and circularity.**99**



Figure 4. In 2002, the author's firm imagined the rebuilding of the New York City World Trade Center site after 9-11 as a series of linked "vertical neighborhoods," connected by a memorial garden.



Figure 5. A rendering of a proposed replacement of World Trade Center, New York City, as a "vertical neighborhood."

vertical expansion as the de-facto creation of "cities within cities" (see figures 5 and 6).

If we take this approach, we begin to see that the pressing issues generally affecting our cities also apply to tall buildings, from infrastructure and mobility, to program mix, to sustainability and circularity. A wellplanned mixed-use development can incorporate a flexible balance of residence types and sizes with a variety of purchasing/ rental models, offices, retail, hospitality spaces, amenities, childcare, and healthcare facilities, green public spaces, etc. As such, it would also require the design of very specific people flows and the careful organization of program accessibility. Such developments could effectively become "walkable" 15-minute cities—compact master plans for vertical cities.

In terms of the housing offer, many of our current urban dwellings do not adequately cater to contemporary needs and resident constellations. As a result, larger homes that were previously built for the traditional family set-up have since been either divided into flats, or turned into "flat-shares" where people rent a room in a shared house. Recent developments in micro-living and live-work typologies attempt to tackle this issue. The COVID-19 outbreak may mean that in the future, flexible new micro-living models will increasingly be incorporated into mixed-use high-rise developments. As such, not only will these "neighborhoods in the sky" cater to a broader cross-section of the urban population, they will also ensure that large numbers of people are not forced to live in one dwelling as a result of their financial means.

In fact, many cities are now incorporating regulations stipulating the allocation of affordable housing in all new residential developments. Such regulations can successfully play an important role in ensuring that lower-income members of the population (many of whom are often essential workers) are no longer relegated to housing in mono-functional zones on the outskirts or in the less-desirable areas of our cities. With such regulations in place, the composition of the residential offering in high-rise developments can therefore help to create more balanced and inclusive housing models and neighborhoods, while simultaneously helping to tackle housing shortages.

The lessons we have learned from the COVID-19 pandemic concerning the need for more communal green spaces can also be applied to how we design tall buildings. The need for increased open air and green spaces can be met by the incorporation of skygardens, platforms, terraces, raised public parks, and shared outdoor amenity programs (see figures 6, 7, and 8).

Furthermore, individual vertical developments can apply sustainable and circular principles to both their construction and operation, while bottomup planning can ensure that future residents play a role in determining the nature and values of their habitat, in addition to proposing potential new economic models and community-led initiatives.

While we may see more regulations designed to avoid overcrowding, we can also expect there to be new qualitative attributes assigned to the different functions and areas of our buildings that go beyond mere measures or ratios. In the end, it is not about creating more space per person, or more space between people; it is about creating healthier, better, and safer spaces. It is about designing from the inside out, again balancing a people-centric approach with a planet-centric approach, and as such, considering from the outset of the design the life span of the development, its eventual reuse, or its disassembly and retrofit.

Finally, the thinking and technology currently being developed in Smart City models can also be applied to tall buildings (see Figure 9), from waste and water management to traffic flows, and from air filtering systems and ventilation to automation. As such, we and our buildings will "learn by doing." How our vertical "cities within cities" develop and improve will be greatly aided by the incorporation of new



Figure 6. The high-rise complex at Southbank, Melbourne, will feature an elevated park and plenty of green space at height. Such features will be critical to maintaining healthy cities, but they cannot be limited to single projects. © Norm Li



Figure 7. An overall view of the Southbank development, in Melbourne. The objective is to create an integrated vertical neighborhood with greenery and amenities spread throughout. © Norm Li



Figure 8. A detail view of the greenery-laced balconies in the twisting portion of the highest tower at Southbank, Melbourne. © Norm Li



Figure 9. Applying the principles of the Smart City to a high-rise context will yield substantial benefits, if the application is well-integrated with solid placemaking principles.

technologies. These technologies will form part of a holistic environment that not only serves the inhabitants, but also the planet.

Conclusion

Ultimately the coronavirus pandemic has brought about an urgent need for us to re-think our cities and how they operate to serve their populations. In the coming years we will witness change. And while being in a state of flux means being in a state of uncertainty about what should be done, it is also the time in which we must establish a new direction of action. For architects, planners and policymakers, it is ultimately a moment we can embrace to reimagine, reshape, and reinvigorate our cities to adequately prepare them for the future.

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