Prologue - Future Cities - City Futures

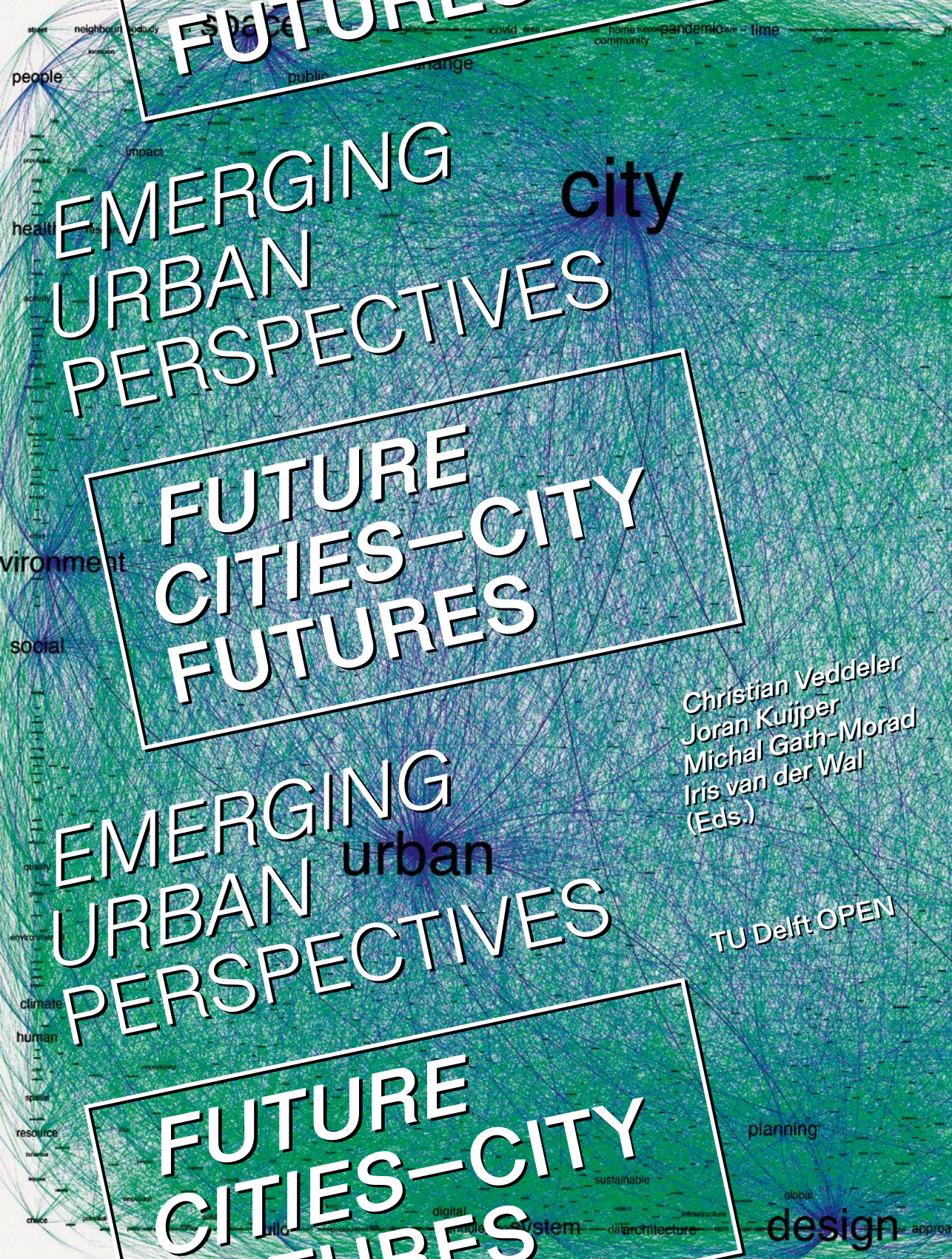
Veddeler, C.B.; Kuijper, J.A.; Gath-Morad, Michal; van der Wal, I.A.

Publication date
2023

Document Version
Final published version

Published in
Future Cities—City Futures

Citation (APA)
Veddeler, C. B., Kuijper, J. A., Gath-Morad, M., & van der Wal, I. A. (2023). Prologue - Future Cities - City Futures. In C. Veddeler, J. Kuijper, M. Gath-Morad, & I. van der Wal (Eds.), *Future Cities—City Futures: Emerging Urban Perspectives* (pp. 14-55). TU Delft OPEN Publishing.


EMERGING
URBAN
PERSPECTIVES
city
FUTURE
CITIES–CITY
FUTURES
Christian Veddeler
Joran Kuijper
Michal Gath-Morad
Iris van der Wal
(Eds.)
TU Delft OPEN
EMERGING
URBAN
PERSPECTIVES
urban
FUTURE
CITIES–CITY
FUTURES
people
impact
social
climate
human
resource
planning
design
sustainable
digital
architecture
pandemic
time
community

COLOPHON

Future Cities—City Futures
Emerging Urban Perspectives

EDITORS
Christian Veddeler[1,2]
christian.veddeler@gess.ethz.ch, https://orcid.org/0000-0003-1548-5285

Joran Kuijper[1]
j.a.kuijper@tudelft.nl, https://orcid.org/0000-0003-4323-5267

Michal Gath-Morad[2,3,4]
mg2068@cam.ac.uk, https://orcid.org/0000-0001-7673-6290

Iris van der Wal[1]
irisfenderwall@gmail.com, https://orcid.org/0000-0002-7239-119X

1 Delft University of Technology, Faculty of Architecture and the Built Environment, Department of Architecture, Delft, The Netherlands
2 ETH Zürich, Department of Humanities, Social and Political Sciences, Chair of Cognitive Science, Zürich, Switzerland
3 University of Cambridge, Department of Architecture, The Martin Center for Architectural and Urban Studies, Behavior and Building Performance group, Cambridge, United Kingdom
4 University College London (UCL), The Bartlett School of Architecture, The Space Syntax Laboratory, London, United Kingdom

KEYWORDS
City; Future; Urban; Design; Building; Architecture; Environment.

PUBLISHED BY
TU Delft OPEN Publishing, Delft University of Technology, The Netherlands

ISBN 978-94-6366-642-8
DOI https://doi.org/10.34641/mg.55

Electronic version of this book is available at https://books.open.tudelft.nl/

PROOFREADING
Simon Milligan

BOOK BLOCK DESIGN/TYPESETTING
Joran Kuijper

SPECIAL THANKS TO
Roberto Cavallo, Delft University of Technology, Faculty of Architecture and the Built Environment, Department of Architecture; Werner Sübai, Gerhard Feldmeyer, and Joachim Faust, Helmut Hentrich Foundation; Lola Ben-Alon, Columbia University, Graduate School of Architecture, Planning and Preservation (GSAPP), New York City

Cover graph by Michal Gath-Morad, edited by Christian Veddeler and Joran Kuijper

TU Delft BK Bouwkunde
Delft University of Technology Faculty of Architecture and the Built Environment

TU Delft OPEN

EMERGING URBAN PERSPECTIVES

FUTURE CITIES—CITY FUTURES

EMERGING URBAN PERSPECTIVES

FUTURE CITIES—CITY FUTURES

Christian Veddeler
Joran Kuijper
Michal Gath-Morad
Iris van der Wal
(Eds.)

TU Delft OPEN

Prologue—Future Cities—City Futures

Christian Veddeler
Joran Kuijper
Michal Gath-Morad
Iris van der Wal

‘Cities, like dreams, are made of desires and fears, even if the thread of their discourse is secret, their rules are absurd, their perspectives deceitful, and everything conceals something else.’

Italo Calvino. Invisible Cities (1978, p. 44)

PART 1 THE KIND OF PROBLEM A CITY *STILL* IS *[COMPLEXITY]*

The title of this section is taken almost verbatim from the last chapter’s title of Jane Jacobs’s *The Death and Life of Great American Cities* (1961, pp. 428–448). Our addition of the word ‘still’ emphasizes the relevance of revisiting Jacobs’s arguments in today’s context. In her critique of the functionalist city, she argues for the recognition of complexity in urban planning instead of providing generalized and oversimplistic solutions. Jacobs states that urban planners misunderstand a city when they tend to deal with problems of simplicity, jumping to easy conclusions

← Asakusa, Tokyo (photograph by Rasmus Hjortshøj).

and only paying attention to reducing the number of variables while disregarding many others. In her words, 'cities happen to be problems in complexity' (Jacobs, 1961, p. 433); she proposes understanding the city as an intricate process rather than a physical object. Thus, city planning must deal with such systems in which the collective behaviour of its parts entails the emergence of characteristics that can hardly, if at all, be inferred from the properties of the parts (CSS, 2022). In the words of Rittel and Webber (1973, p. 160), this complexity is characterized by its 'wicked problems'. They are 'ill-defined', contain confusing or contradictory information, complex interdependencies, and the conflicting values and interests of diverse actors, stakeholders, and decision-makers. Rittel and Webber (1973, ibid.) emphasize that such 'wicked problems' are difficult to solve, as there is no single solution. Outcomes are not about right or wrong but rather about better and worse.

The design of future cities should take account of complexity as it continues to be central to the problems of cities accelerated by various drivers, such as globalization, demographic development, and environmental and health concerns.

Recent figures for demographic development indicate massive global urbanization that continues to go hand in hand with sizable demographic growth. UN Habitat (2020) expects that the world population of currently 8 billion people (UN Habitat, 2022, November 15) will increase to 9.5 billion by 2050 and will peak at almost 11 billion in 2100. From 1900 until today, the global population has risen fivefold, not least because the average lifespan has also doubled (Zakaria, 2020). Currently, 55 per cent of the world's population lives in cities. With urbanization expanding at its current rate, this proportion is expected to increase to approximately 68 per cent by 2050 (UN Habitat, 2020). In other words, by 2050 no less than 6.3 billion people will live in urban areas, in comparison to merely 2.3 billion in 1990 (UN, 2018). Not only the scale but also the pace of the development is unprecedented and best illustrated by comparing the current

Tamara Streefland in Chapter 1 reflects on complexity by imagining our urban lives in 2050.

In Chapter 2, Jolijn Valk presents a broad vision of the city as a growing field for biodiversity and cultural diversity.

figures to historic ones: In 1800 only 3 per cent of the significantly smaller world population lived in urban areas, but this number increased to 14 per cent in a century and to 30 per cent by 1950. Extrapolating the present growth rate, at least theoretically, full urbanization would be reached by 2100 (Florida, 2008).

Urbanization is not only characterized by demographic growth but also by migration between continents, countries, regions, and cities: Batty (2018, p. 19) denotes the historic change of the last two centuries as a transition from a 'non-urban to an urban world': This, in his words, is a complete transformation of human habitat from 'rural to urban' and from 'local to global'. Different parts of the planet certainly are confronted with different intensities of urbanization. In the Western world, in Europe and North America in particular, urbanization is saturating. While still moderately rising, it will peak within the next 30 years alongside the demographic decline of ageing societies (Zakaria, 2020). Developing countries are and will be the main contributor to the rapid increase of population, associated urban growth, and the continued rise of megacities with populations larger than 10 million (Baklanov et al., 2016).

As of today, cities provide 80 per cent of the world's GDP (UN Habitat, 2020). Cities also contribute significantly to ecological damage, as the process of urbanization continues to have significant adverse effects on the environment globally with air and water pollution, biodiversity loss, soil degradation, deforestation, global greenhouse gas emissions, and climate change as consequences. Even though urbanized areas account for less than 2 per cent of the planet's surface, cities consume 78 per cent of the world's energy (UN, 2022b) and are largely reliant on fossil fuels. They produce more than 60 per cent of global greenhouse gas emissions (ibid.). Cities also account for an estimated 50 per cent of global waste (OECD, 2022).

The rapidly increasing rate of urbanization and population growth will intensify this tendency. The physical expansion

of cities not only requires exceptional efforts but will create enormous pressures on scarce resources, such as land, raw materials, and energy, which might reach beyond the planet's environmental capacity (Raworth, 2017).

Consequently, questions of both urban sustainability and resilience play a fundamental role in the design of future cities. The Brundtland report (1987, n.p.) provides a compelling definition of sustainability as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Due to the vast and enduring impact of urbanization, the challenge of enabling sustainable urban life is essential. Goal 11 of the United Nations' Sustainable Development Goals (UN, 2022a) consequently addresses sustainable cities and communities. Central socioeconomic targets are inclusion, safety, and diversity. Positive environmental impact aims at resource efficiency, mitigation, and adaptation to climate change. The UNEP (2022) addresses the strong link between the quality of urban life and natural resource management, as higher resource efficiency correlates with greater productivity and innovation.

Another focal point of attention is urban resilience to unforeseen calamity. The United Nations Office for Disaster Risk Reduction (UNDRR, 2022, n.p.) defines resilience as 'the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management'.

Due to the high concentration of people, cities are particularly vulnerable to the consequences of climate change, natural disasters, and the spread of disease (UNEP, 2022).

As witnessed during the recent COVID-19 crisis, cities are affected by the spread of contagious disease. Epidemics and pandemics are not part of cities' history but today's

In Chapter 3, Cresci, Galeazzi, and Von Richthofen discuss the challenges of urban decarbonization.

urban reality. The recent events have exemplified the ostensible symbiosis of urban concentration and infection spread (Salama, 2020). Martínez and Short (2021) use the COVID-19 pandemic to describe urbanization as an accelerant of infection and cities as target-rich environments for virus transmission. The cities considered most efficacious in combining both dense concentrations of people and global connectivity have proven to be especially vulnerable to disease transmission. Their main competitive advantage of local and global proximity also bears at least one major disadvantage (Rode, 2020).

Bola Grace addresses the relationship between population health and the built environment in Chapter 4, titled 'Heart, Health, Habitat', discussing societal and built-environmental factors of health, equity, and inclusion.

Pilosof, Oborn, and Barrett in Chapter 5 discuss the impact of future cities' hybrid healthcare systems across physical and virtual environments.

So far, pandemics have not eradicated the city from existence. Instead, the most recent has become a catalyst for urban change (Mir, 2020). Past responses to pandemics have significantly influenced both the conception and shape of cities.

For the last two centuries, urban development was driven by engineering efforts to make cities healthier and to improve the quality of urban life (Sennett, 2018). Next to the establishment of medical institutions such as hospitals, the introduction of underground sanitary infrastructure and water treatment facilities provided the foundation for better hygiene.

The establishment of zoning codes and building regulations above ground were established to safeguard the reduction of overcrowding and pollution and the improvement of air circulation and daylight access (Bereitschaft & Scheller, 2020). Such initiatives improved public health and reduced the risk of contagious disease significantly. Until recently, the Spanish Flu of 1918–1920 was the last global pandemic.

The question is whether to expect longer lasting effects on the city induced by COVID-19. The sudden awareness of vulnerability to airborne disease has resulted in a considerable change in people's behaviour. Salama (2020) describes the socio-spatial implications of such impact: driven by the immediate threat of the disease, measures for social distanc-

ing and the widespread introduction of remote working have led to the general avoidance of face-to-face contact and proximity, formerly perceived as essential prerequisites of urban life.

Working from home caused dispersion, disaggregation, and both physical and social fragmentation (Harris et al., 2016). Consequently, it has led to abandoned offices, entire business districts closing, deserted streets and public spaces, and a decline in the use of public transport. Concerns for public health, expressed through social distancing measures, lockdowns, curfews, and travel bans, have outweighed the former pull of cities and have diminished their associated benefits. Simultaneously, nonurban lifestyles in geographically dispersed locations outside of dense cities have suddenly gained attractiveness (Lennon, 2021).

In Chapter 6, Els Verbakel uses the work of her students to illustrate 'cities of the new real' and discusses the relationships between physical space, synchronous time, virtual space, and asynchronous time.

As a matter of course, such change not only reflects issues of changing urban morphology but also raises environmental concerns; city densification is recognized as an environmental strategy consistent with reducing the ecological footprint of cities in contrast to low-density urban sprawl (UN, 2015). At least temporarily, COVID-19 caused a conflict of city densification and measures for mitigating the pandemic. Environmental protection and public health valued opposite ends of the spectrum of concentration of people in cities.

It is unlikely that this dilemma will last, given the less severe impact of the latest COVID-19 variants. Also, there is evidence that connectivity and living conditions, rather than urban density, are related to the COVID-19 infection rate over time (Hamidi et al., 2020). The argument that COVID-19 is a driver of 'dis-urbanism' (Aidarova & Aidar, 2021), the exodus of population from cities to dispersed areas, with the knowledge of today, seems to have been no more than a short-lived phenomenon.

In contrast, the accelerated adoption of digital tools during the pandemic and the lasting hybridization of knowledge work might persist and affect both the city and citizen behaviour profoundly. Remote working, telecommuting, video

conferencing, cloud-based collaboration, online learning, shopping, and social media entertainment are unlikely to disappear with a fading pandemic. Until recently, the benefits of urban living in human proximity outnumbered its disadvantages of high prices for buying and renting property (Beddoes, 2020, June 11). The change that remote work introduces is significant, as living close to a place of work appears less relevant and no longer seems to be decisive in determining where to live (Shenker, 2021, March 26). Will the fundamental change of commuting patterns between work and home have a lasting impact on the city's form and function, as Batty (2021a) suspects? Will this new 'geography of work' (Florida, 2021) change the value of urban locations profoundly in favour of remote working and living in cheaper suburbs–or even outside of cities (Bereitschaft & Scheller, 2020)?

Will this lead to a permanent decline in office demand and drag down urban life alongside retail amenities, cultural institutions, and public transport? Or is the city resilient enough that, despite the disruption that COVID-19 caused, the appreciation of the complexity of urban life and its associated benefits are here to stay?

← Sendai (photograph by Rasmus Hjortshøj).

‘If the environment is visibly organized and sharply identified,

then the citizen can inform it with his own meanings and connections.

Then it will become a true place, remarkable and unmistakable.’

Kevin Lynch. The Image of the City (1960, p. 92)

PART 2 LOCATION, LOCATION, LOCATION]

[PROXIMITY]

Harold Samuel, the founder of Land Securities, the largest commercial property development company in the UK (Frangoul, 2017, March 2), is deemed responsible for having coined the expression ‘location, location, location’ (Safire, 2009, June 26), which emphasizes the role of location in determining the value of a building: This prevalent catchphrase highlights the value of proximity in urban real estate.

To explicate, urban economics identifies the importance of proximity to production and consumption and its association with spatial concentration and density. Quigley (2006) describes the mechanism of agglomeration effects and states that spatially concentrated economic activity is the key force that brought cities into existence.

In his book *Inventing Future Cities*, Michael Batty (2018) describes cities as progressions of such aggregation, with urban form and organizing structure resulting from intricate negotiation and decision-making of many stakeholders over time: therefore, cities have evolved constantly. Urban agglomeration enabled the specialization of labour, the surplus production of food, goods, and materials, trade and markets, and the acceleration of technology and science (Lynch, 1954).

The economic power of proximity, according to Jacobs (1969) is based on grouping, pooling, and division of labour. Density, accordingly, becomes both a prerequisite and advantage of cities and a stimulus for economic activity (Sennett, 2020). Growing density reflects the evolutionary progress of cities, with the number of possible human connections and opportunities growing in parallel to the size of cities (Batty, 2018). The trade-off between the benefits and costs of density is best explained with population concentration increasing due to the attractiveness of a city, and rising pressure on higher housing and land prices (Duranton & Puga, 2020). Marshall (1920) rationalized the advantages of economic agglomerations for the development of cities originating from access to goods and services, pooling of skilled labour, and the exchange of information, knowledge, and skill: Face-to-face contact enables social interaction, local cohesion, and trust building in geographic proximity. Even 'weak ties' in large-scale and informal but localized urban networks have proven to be strong, because the manifold connection to relative strangers in cities provides wider access to opportunities and ideas (Granovetter, 1973).

Spatial competition for location, in relation to transportation costs, is no less than the trade-off of proximity and distance, utility gains, and cost savings of transportation and production. The German agriculturalist von Thünen (1826), first identified the economic rationale of the benefits and costs of proximity by considering land use and densities around the central market of an agrarian town. High transport costs for

In Chapter 7, Filipa Pajević investigates the impact of pandemic-driven changes in the function and valuation of physical workspaces in real-estate markets.

both goods and people forced production to take place near that market and the residences of workers. Consequently, cities traditionally have grown around spatially centralized economic activity: Land and real estate property closer to the centre is more valuable and produces higher land and house prices, rents, intensity of land use, and densities (Batty, 2018). From centre to periphery, the spatial distribution of household income typically decreases (Quigley, 2006).

To explain the continuous and accelerated evolvement of cities as preferred human habitats, Edward Glaeser in *Triumph of the City* (2011) and its sequel *Survival of the City* (Glaeser & Cutler, 2021) emphasizes the phenomenon of proximity as the main driver of urban agglomeration and its main function: To connect people. Urban density enables face-to-face interaction and social and economic exchange. Being more than spatial systems of location and geometry, cities enable community, dynamic collaboration, creativity, commerce, and entrepreneurship. Despite the pervasive availability of long-distance travel and telecommunication, physical proximity among people spurs the creation of ideas, ingenuity, innovation, and progress, because 'cities magnify humanity's strengths' (Glaeser & Cutler, 2021, p. 249). Therefore, cities have become the most attractive environments for the growing majority of people to live in. Driven by proximity and density, cities provide opportunities for interaction, exchange, and development. Moreover, they offer access to the necessities of life, including housing, employment, markets, health care, services, technological advances, information, knowledge, education, social, cultural, or religious life, communities, rights, security, stability, and predictability (Etezadzadeh, 2015).

Nevertheless, cities are confronted with significant challenges caused by this much-acclaimed proximity. Glaeser and Cutler label such downsides the 'demons of density' (2021, p. 5): These include shocks, stresses, pressures, and the threats that face cities. The inventory of ills includes

From a neuropsychological perspective, Mavros, Olszewska-Guizzo, and Makowski in Chapter 8 discuss social density, crowdedness, perceptions, people's responses to their built environment, and the relevance of their findings for urban design.

crime, congestion, pollution, and obviously disease. Furthermore, fierce competition in a dense and expensive housing market leads to gentrification and segregation. Urban inequality consequently drives social tensions and possibly conflicts.

In line with von Thünen (1826), Harris et al. (2016) suggest that the cost of distance has historically determined the location of production, consumption, work, and life: the avoidance of cost related to transportation led to the local concentration of workforces, facilities for mass production, employment options, goods, and services, in the logic of economies of scale. However, technological progress in transportation and communication led to a significant reduction in shipping and travel costs for materials, goods, people, and information while increasing the speed to bridge ever-increasing distances. The nineteenth- and twentieth-century inventions of electrified transport and commuting with buses, trams, trains, and later the private motor car, increased travel radii and resolved the problem of productivity at a distance. Subsequently, the value of proximity was reduced (Batty, 2018): 'Distance got replaced by travel time, telecommunication eliminated both' (p. 123).

Technological advances in transport and communication technology allowed people and goods to be moved over space and time. This had a significant impact on the demand for physical proximity in cities and urban structure (Krugman, 2011). Shipping and commuting led to the dispersion of the population out of city centres (Batty, 2018). Decentralization, had a radical effect on urban structure and produced car-dependent suburbanization and urban sprawl. Deindustrialization shifted production to the service sector. It reduced dependency on specific sites and the city centre, which was no longer the sole midpoint of economic and cultural activity (Hernández-Morales et al., 2020).

In Chapter 9, Achilleas Psyllidis discusses design strategies for urban health and well-being by revisiting proximity, walkability, and accessibility.

The arrival of digitally-based services seems to make the site redundant more generally. Moving information has become more important than transporting people and goods (Harris et al., 2016). While in the nineteenth century the cost of transport collapsed, in the twentieth century this was the case for communication. Today, with widespread availability of communication technology, we witness near zero cost for digital transport of goods and services (Zakaria, 2020) and 'near zero marginal cost for digital production' (Raworth, 2017, p. 191).

Considering the impact of economic globalization on marginalized shipping costs and offshoring production, Saskia Sassen in 'Locating Cities on Global Circuits' (2005) challenges the historic relevance of location from a global perspective. As cities are parts of nonlocal interaction, the categories of physical proximity, built density, and the locality of urban space, she argues, appear negligible. Cities are rather embedded in large, complex, and globally distributed networks that are characterized by 'deterritorialisation', 'dematerialisation', and 'digitisation' (Sassen, 2005, p. 145). Translocal 'tunnel effects' (Ascher, 1995) describe how geographically distant but technologically interconnected global metropolises prefer highly developed communication networks over the immediate proximity, scale, and form that local binding would offer. Marshall McLuhan's notion of the 'global village' (1962) anticipated communication technology that allowed a globally universally connected humanity. Building on that idea, futurist Alvin Toffler (1970; 1980) foresaw the facility of 'electronic cottages' as dispersed future workplaces of telecommuting, with the home, and not the city, as the centre of society. The parallel of recent COVID-19-induced experiences of remote working at global scale seems to confirm Toffler's forecast.

Not only since the recent pandemic, a central question for the development of future cities is whether technological progress is the driver of the devaluation of physical proxim-

ity. With the internet and information technology emerging, The Economist in 1995 proclaimed the 'Death of Distance' (Cairncross, 1995, Sept 30). Due to the insignificant costs of participation within both universally accessible and global networks of information and communication, trade, and transport, in Cairncross's argument, distance becomes practically irrelevant.

Leamer and Storper (2001) object to that perspective. Despite the dispersion of transportation and communication with the low costs of commuting, shipping, and digitally transmitting information, they claim that physical proximity is becoming more relevant rather than less: The ever more specialized division of labour, in their argument, requires both face-to-face interaction for meaningful and long-term relationships and the spatial concentration of economic activity enabling purposive coordination and collaboration.

Glaeser (2011, p. 61) coins this ostensive contradiction 'the paradox of the modern metropolis': even with significant reductions in cost, time, and effort for connecting across distances, urban location remains critically important. Glaeser and Cuttler (2021, p. 196) insist on the 'sticking power of cities': In their argument, the benefits of physical adjacency and face-to-face contact as main advantages for socialization and collaboration in the long term outperform any advance in technological communication. Similarly, Florida in *The Rise of the Creative Class* (2002) and *Who is your City?* (2008) emphasizes the importance of both physical location and proximity as a consistent driver of innovation and economic growth. He outlines the phenomenon of a 'spiky world' (Florida, 2008, p. 15) in a pictorial illustration of local peaks of economic resources, activity, ingenuity, and concentrations of creative talent. He states that the aggregation of high-level economic activities takes place only in a select number of global metropolitan areas. This view contrasts with the image of a globalized and equal opportunity 'flat world', which is free from specific geography, as coined by Friedman (2005). Local 'clustering', according to Florida (2008, p. 19), is a key driver of economic activity: It results in

local concentration, and connection of people, productivity, creativity, and talent. As such talent is mobile and privileged in choosing where to live, cities that are attractive, competitive, and offer opportunities peak, while cities without these characteristics do not.

The value of location therefore is characterized by its relation to space but also to time: It is both the properties of physical place that matter and the intensities and qualities of dynamic interaction among its inhabitants (Batty, 2018).

Gia Jung in Chapter 10, titled 'Cities and love', presents an original perspective on generative design as mapping of human values in cities.

‘But the city is not, cannot and must not be a tree.’

Christopher Alexander. A City is not a Tree (1988, p. 84)

PART 3 CONTRADICTION AND COEXISTENCE

[DIVERSITY]

In *The Death and Life of Great American Cities*, Jane Jacobs (1961) vigorously articulates her critique of modernist city planning and urban renewal as a severe oversimplification of the city as a seemingly functional system doing no justice to the complexity and diversity of human life. Her critique addresses the ‘functional city’, as initially proclaimed by the ‘Charter of Athens’ (CIAM, 1933), that dogmatically coupled decentralization, reduced density, and separation of activities through designated urban zoning. The division of areas of living and working improved access to space, light, and air but created low-density, monofunctional urban sprawl outside of the traditional city.

Instead of universally planned, mono-functionally zoned cities, standardization, repetition, and monotony, Jacobs (1961) advocates urban planning in open-ended processes that are gradual and small-scale. She argues for dense and diverse neighbourhoods and for preservation: The integration of a variety of uses and users appropriately reflects human behaviour and the social composition of communities that, in her words, are fine-grained, mixed, and connected. Lively public spaces and walkable streets, squares, and parks nourish the participation and engagement of citizens

Dalia Munenzon in Chapter 11 highlights the relevance of urban commons as a remedy to urban, social, and environmental vulnerabilities.

← Nørreport, Copenhagen (photograpgh by Rasmus Hjortshøj).

in their communities. Jacobs maintains that in well-functioning cities, enrooted residents as a matter of course exercise social control with their 'eyes on the street' (ibid., p. 35). This implies not only crime prevention but identification, care, and trust.

Jacobs (ibid.) critizises the codified functionalist plan, that according to her argument, only appears to be rational but in fact is deterministic in nature, and engages in formalistic simplicity. Built on the logic of division of labour, functionalism favours simplicity over diversity and combines top-down control, economies of scale, standardization, and mass production. It applies Taylor's 'principles of scientific management' of 1911 (Taylor, 2004), which rationalize the division of elements of work, and of work and responsibility. The division of labour processes into standardized tasks that are separated from management supervision became the basis for control, increased productivity, and efficiency. The rise of the factory and the office alongside their geographical separation from residential areas for workers drove urban segregation into zones for production and habitation. In alignment with Taylor's management logic, the spatial separation and specialization of home life from work life became industrial urban reality (Zakaria, 2020): Synchronized life would alternate between two geographical poles in the rhythm of the assembly line. Physical separation of material and intellectual work, labour, and capital (Lefebvre et al., 1996), and of different social classes (Sennett, 2018) was reinforced. Not only did the division of labour enable the introduction of a functionalist structure of cities; it also established social divide (Harvey, 1989).

Read (2005) exposes the orthodox agenda of functionalist planning as ideologically, spatially, and socially normative and exclusive because it treats the city as an 'instrument of social betterment, efficiency and hygiene' (p. 12). Functionalist cities therefore fail to allow for diversity: for inclusion, heterogeneity, and the intricacy and thus complexity and contradictions of urban experience (Venturi, 1966).

In Chapter 12, Brendon Carlin presents an original attempt to describe architecture's capacities to empower inhabitants, within specific forms of order, social relationships, and forms of life that are produced through the design, construction, use, and maintenance of architecture, technology, and infrastructure.

As of today, many cities are still overzoned, monofunctional, and therefore inflexible. Urban buildings mirror the city's spatial and temporal separation of uses and users: of life, work, production, and consumption (Ratti & Claudel, 2016). Marc Augé (1995) explains this phenomenon in his reflection on 'non-places', where the homogeneous and anonymous functionality of commerce, transit, or leisure entails compliance of their users imposed by formalized rules. Limited operation hours exemplify the production of temporarily used buildings that follow the logic of modern labour (Sennett, 2005). Planning for standards and mono-functionality restricts adaptability for alternative uses. It produces overdimensioned, unsustainable, and for most of the time largely vacant urban buildings, infrastructures, and districts. The result is severe underutilization of such resources as land, energy, material, and capital.

This effect became clearly visible during the unexpected COVID-19 crisis, with entire central business districts abandoned in lockdown, becoming practically useless overnight. The obvious shortcomings of the functionalist city are substantiated by the fact that it could not adapt to the complex problems that confronted it. This seems to confirm Harvey's (1989) statement that when a city does not allow contrast, fragmentation, discontinuity, heterogeneity, and difference, it becomes vulnerable to the reality of diversity, and both persistent and abrupt change.

Referring to Hilberseimer's paradigmatic Hochhausstadt project of 1924, Christopher Alexander in *A City is not a Tree* (1988) identifies the shortcomings of the functionalistic urban plan in relation to the complexity of human life. He criticizes the simplicity of the 'artificial city', which is deliberately structured as a closed and static system. Its 'nested hierarchy', which is defined as a 'tree structure', separates the city into zones, functions, and units. This, in his argument, is in sharp contrast to the reality of overlapping hierarchies in social networks, better defined as a 'semi-lattice' structure. Planning the city according to the rigid logic of a hierarchical

tree structure forbids any diversity, ambiguity, or multiplicity: The richness of urban life.

Colin Rowe and Fred Koetter in *Collage City* (1978) address modernist urbanism's socio-spatial dilemma. In their book's chapter the 'crisis of the object' (pp. 50–85), they formulate the problem of little variation and differentiation achieved by the porous structure of the modernist city plan and the mechanical array of similar architectural objects: The ambiguous relationship of these objects and the open space that surrounds them results in largely undefined public space. The lack of scaling boundaries and spatial contrast impedes peoples' orientation and the notion of belonging. The hierarchical order of buildings and infrastructure, instead of spatial and social cohesion, segregates unrelated environments. Excessively available but underutilized and therefore anonymous open areas do not function as public urban spaces but as separators of territory (Rowe & Koetter, 1978). Abandoned green areas between buildings, typically uninviting for public use, discourage spontaneous and informal interaction and lack a sense of ownership. The identification of city users with such space remains fragile.

As the space between is neither public nor an attractive destination for residents, it becomes a distance to bridge between city functions, described by Sennett (1977, p. 14) as 'vector space'. The open space misses the fine grain that Jacobs (1961) considered essential for public space to function. Accordingly, it is weak, unattractive, hostile, and therefore largely neglected. The private domain of housing units cannot compensate for the fundamental lack of urban life. Spatial zoning consolidates both the spatial and social segregation of home and work and the disintegration of urban life (Sennett, 2018).

By contrast, Sennett (ibid., p. 241) emphasizes the importance of the 'experience of a collective life' in creating community. He argues that cities must accommodate the complexity of human life, which is full of contradictions and ambiguities. Public space here is essential to enabling diverse and meaningful social encounters. It must be as useful

Wolf Mangelsdorf emphasizes the importance of quality of urban life instead of merely urban form in Chapter 13 titled 'Wechselwirkungen: Rethinking urban planning and densification'.

for the individual, the local, and the stranger, as it is for communities, all engaged in different ways of living that coexist in the city (Lefebvre et al., 1996). The public space of the city must therefore provide a variety of form and flexibility of functions that allow contrasting social and cultural identities to meet and engage.

Pietrostefani, Dabaj, and Boano in Chapter 14 elaborate on rethinking spaces of exchange for future cities. Using the example of Beirut, they illustrate the relevance of urban thresholds that enable social activities and self-supporting local neighbourhoods.

Schreiber and Carius (2016) identify such interaction as a precondition of urban sociability to prevent socioeconomic polarization and spatial segregation. For Sennett (2018), the experience of complexity and diversity substantiates urban virtues of learning to live with strangers of different lifestyles and ethnic and class backgrounds.

Social distancing, remote work, and unparalleled restrictions in the use of public space during the COVID-19 pandemic abruptly demonstrated how vulnerable urban life is in the public domain. The restriction of access to public space has limited direct face-to-face contact between strangers (Sennett, 2020). Martínez and Short (2021) suggest that the inaccessibility of public space particularly for lower income groups was detrimental, due to lack of alternatives: Having limited private space at their disposal for collective interactions, inaccessible public space led to loss of social intimacy.

With a focus on cognition, Michal Gath-Morad, highlights the importance of choice for architectural and urban design of active and healthy built environments in Chapter 15.

Sharon Yavo-Ayalon reflects on New York's sidewalks as a lively public space in Chapter 16 and the impact of COVID-19 on public space and urban life.

The increasing privatization of outdoor and green spaces (Scott, 2020), and conditions of work reinforced social inequalities, as spatial and social polarization do interrelate (Honey-Rosés et al., 2020). The fact that social distancing and remote work, was not feasible for essential workers, and the 'face-to-face economy' (Glaeser & Cutler, 2021) additionally not only made evident the imbalance in the exposure to disease infection of manual and mental labour (Sennett, 2020); it also exaggerated social divides (Harvey, 2020).

The COVID-19 pandemic thus unveiled the exclusive nature of remote work, the importance of public space for urban society in general, and the vulnerability of deprived parts of urban society to exclusion from these. It amplified existing conditions of growing inequality, social exclusion, and spatial segregation (Glaeser & Cutler, 2021).

‘What is real is the continual change of form: form is only a snapshot view of a transition.’

Henri Bergson. Creative Evolution (1911, p. 301)

PART 4 GROWTH AND CHANGE

[DENSITY]

Cities are confronted with constraints related to globalization, demographic development, environmental concerns, and technological advance that require strategies to steer, facilitate, and shape transformation. Expanding urbanization at unprecedented scale increases pressures on cities to cope with constant adaptation and change. Regarding cities not as static objects but as dynamic processes (Jacobs, 1961), as described above, provides both opportunities for urban evolution and threats of urban stagnation and decline.

With a focus on urban morphology, Batty (2018) describes how the growth of cities is characterized by two opposing directions of progression: Outward expansion and inward densification. While expansion identifies growth in size outside of the existing city, densification means development of vacant areas and existing structures from within. The forces that drive urban growth into densifying city centres, sprawling suburbs, or polycentric clusters (Batty, 2021b) vary.

As described above, urban proximity and agglomeration effects have traditionally attracted development towards city centres. Pulled by a market, ‘centripetal forces’ (Glaeser, 2011) concentrate economic activity. This causes densification and concentric growth around the heart of cities. In the

← Addis Abeba (photograph by Rasmus Hjortshøj).

logic of such urbanizing forces, the closer a location is to the centre, the more valuable it is. Push forces in the opposite direction drive expansion of cities into the surrounding land. At the periphery of cities, they cause dilution of urban activity and have a significant impact on the morphology of the traditional city. Batty denotes such a development outward growth (2018, pp. 136–143), where 'centrifugal forces' (Glaeser, 2011) unevenly diffuse spatial distributions of economic activity and population. The push of dispersed natural resources, in particular cheap and available land, attracts building development away from the inner city. The trade-off for lower land prices is the greater distance of sprawling 'edge cities' (Harvey, 2000, p. 8) from the city centre, resulting in de-agglomeration and fragmentation of the city. Outward urban growth is often characterized by urban sprawl, low-density building, monofunctionality, homogenous form, and dependence on commuting by private car to connect the urban fringe with the city centre.

Enabled by ever-increasing transportation facilities and dominated by the private motor car since the twentieth century, peripheral city expansion equals suburbanization. Both urban sprawl and its attendant dependence on infrastructure are resource intensive and consume vast amounts of land, raw material, energy, and capital. As infrastructure is often dimensioned for peak hours, it provides overcapacity most of the time. It is financed by taxpayers' money but only used selectively, which consequently entails that development of cheap suburban land is subsidized by public funds (Downs, 1999). Hardin (1968) defines such a phenomenon as a 'tragedy of the commons', where public goods and resources are overexploited by individuals to satisfy self-interest but are depleted for all. Furthermore, the environmental costs of suburbanization are significant: Sprawl and its associated infrastructure and commuting cause unsustainable levels of congestion, emissions, and pollution. Originally seen as an opportunity of liberation from overcrowded and high-priced city centres, suburbanization has often caused urban decline (Batty, 2018). Concurrently with the prevalence of the private motor car and building of transport infrastructure, in the twentieth century a massive urban exodus took place from the city's traditional centre to its outskirts (Glaeser & Cutler, 2021). In parallel, urban de-industrialization led to factory jobs vanishing. Glaeser (2011) summarizes accordingly the two indications of 'bad cities': urban sprawl from an environmental perspective and urban exodus from an economic one. Despite its negative impact on city centres, for a long time, urban sprawl became the unchallenged blueprint for modernist urban planning. In most global cities, it remains the dominant model of growth (Batty, 2018).

Since the last quarter of the twentieth century, instead of propagating only outward growth, some planning initiatives have shifted towards models compacting existing cities. To revitalize neglected city centres, the development of brownfield sites is preferred over greenfield expansion. The promotion of urban public transport and restrictions on private car use aim to reduce congestion and make redundant traffic infrastructure available for repurposing (Moreno et al., 2021). Inward growth (Batty, 2018, pp. 144–151) not only aims to restructure city centres but also implies reconcentration and the reintroduction of urban activities, proximity, and density.

Upward growth (Batty, 2018, pp. 151–161) implies vertical densification of urban space: the introduction of inner-city high-rise buildings significantly intensifies the use of land while exploiting the value of its central location. Whereas this building typology was previously reserved for commercial uses, urban business districts, and satellite cities of mass-housing projects, nowadays mixed-use and residential functions have become a vital driver of high-rise development in central urban areas.

Next to its positive social and economic impact, densification is instrumental in minimizing the urban ecological footprint, to support the achievement of climate goals and to enhance urban resilience (UN, 2015). Compacting cities helps reduce the energy and resource consumption for buildings, infrastructure, utilities, and transport: The use of shared

amenities is intensified, and travel distances in compact cities are shorter and may be walkable or bikeable. Commuting time and congestion is significantly reduced. The decline of carbon emissions and pollution is beneficial for the quality of sustainable urban life. Following these arguments, upgrading existing urban areas through re-urbanization and increased densification is preferable over the creation of entirely new cities. Resource-intensive urban sprawl can be limited, and for this reason, massive infrastructure can be reduced.

However, the downsides of the density described above exacerbate a problem many cities have: The excessive costs of inner-city housing make urban life unaffordable for large parts of a city's population. Even if the recent COVID-19 pandemic temporarily diminished the attractiveness of dense city centres, the more affluent population continues to prefer city centres over suburbs. Consequently, popular urban areas face segregation and gentrification while the city periphery experiences disaffection and social decay (Harvey, 2000). The report 'Cities of Tomorrow' (EU, 2011) identified how safeguarding the quality of urban life through provision of and access to education, work, and affordable housing is essential to avoid social seclusion.

Glaeser (2011) explains that the excessive costs of inner-city property and rent are caused by a market mismatch of high demand and low supply: Wherever restrictive zoning limits the usability of land, increased building density and height, and mixed-use functions, project development is constrained. He argues that rigid rules for monument protection, even if comprehensible from a preservation perspective, maintain the status quo: Both restrictive zoning and preservation cause stagnation of new building, increased scarcity, housing market competition, excessive housing costs, and thus segregation of those who cannot afford to live in the city. He summarizes this dilemma: 'If cities can't build up then they will build out. If building in a city is frozen, then growth will happen somewhere else' (ibid., p. 163).

In Chapter 17, Sabine Georgi and Tobias Just reflect on urban growth and transformation from a real-estate perspective, identifying challenges for cities, existing properties, public spaces, and transport infrastructure.

Marvin Bratke provides a response to development pressures from an on-demand society. His case studies in Chapter 18 illustrate solutions for more resilient and adaptable urban environments, co-creation, co-ownership models, and platforms for circular planning.

In Chapter 19, Hannah-Polly Williams develops a three-pillar framework for characterizing a sustainable city driven by low emissions, purposeful urban planning, and equitable distribution.

In addition to the three growth models described above, the idea of polycentric cities has recently gained momentum with the notion of self-sufficient and compact urban neighbourhoods within metropolitan areas. The most prominent example, the 15-Minute City by Carlos Moreno (Moreno et al., 2021), propagated a shift from the monocentric city to a city of 'urban villages'. As part of Paris's urban renewal programme, Paris en Commun, the 15-Minute City, or in French la ville du quart d'heure, provides proximity, density, diversity, and accessibility: Mixed-use zoning allows diverse urban functions to be juxtaposed. Short travel distances, preferably by foot or bike, enable convenient access to all essential urban functions, including living, working, commerce, healthcare, education, and entertainment.

The model's emphasis on proximity offers both higher quality of urban life and ecological sustainability. It both promotes social interactions and citizen's participation and it aims to break car dependence, traffic congestion, and pollution and reduce areas for parking in favour of pedestrian-friendly streets.

The 15-Minute City obviously revisits concepts presented by Jane Jacobs (1961) of urban life in New York's Greenwich Village in the 1960s as an example of a vital urban community. However, to avoid becoming a victim of its alleged success, the 15-Minute City model must cope with the risk of segregation and gentrification (Florida, 2021): A critical question is therefore how to ensure even distribution and fair accessibility of attractive urban functions over various 15-minute neighbourhoods and how to guarantee free access and exchange across diverse neighbourhoods. Glaeser (2021) warns that the dictates of market prices will drive the concentration of appealing functions towards privileged enclaves that will remain unaffordable and therefore inaccessible for lower-income groups, thus fuelling inequality and social, economic, and geographical divides.

‘The chief function of the city is to convert power into form,

energy into culture, dead matter into the living symbols of art,

biological reproduction into social creativity.’

Lewis Mumford. The City in History (1961, p. 571)

PART 5 FORM AND PERFORMANCE

[INGENUITY]

The increasing demand for larger, denser, more inclusive, fairer, more sustainable, resilient, healthier, smarter, and more meaningful urban environments fundamentally challenges the existing conception of the city and its utilities, infrastructure, transport, and buildings. The key issue for the high-performance cities postulated is their function in a continuously changing environment: Moraci et al. (2020) address the central question of how to ensure the future city’s positive environmental, economic, and social impact.

A claim frequently heard is that urban development needs to become ‘smart’. This often implies a shift in perspective from material to digital city networks and from material to virtual city space. Digital tools and the integration of both physical and digital infrastructure have made valuable types of information available for the first time in the history of the city. This information allows new insights into patterns of

← Yokohama (photograpgh by Rasmus Hjortshøj).

urban behaviour and performance. The interrelationship of function and use and the real-time alignment of demand and supply couples citizen and city, inhabitant and habitat (Harrison & Donnelly, 2011). The smart city becomes a 'complex eco-system' (Picon, 2015, p. 81) in which digital and physical worlds meet and life-cycles of growth and change develop.

As often stated, the smart city aims for the provision of urban solutions to advance synchronization, efficiency, predictability, safety, and security. Thus, it addresses environmental and social sustainability to improve urban resilience, comfort, and the quality of life (Gassmann et al., 2019; Gath-Morad et al., 2017): The application of smart technology allows control of city performance in stages of planning and in use. This provides a largely untapped source of information to improve decision-making in design, planning, building, and city operation. Data and technology are leveraged for better use of resources, assets, and services, and to empower the participation of citizens, providing for current and future needs of the city population.

In Chapter 20, Samsurin Welch discusses digital disruption and the future city and looks at building resilient cities to adapt to the combined threats of COVID-19 and climate change.

However, such bold promise can be both vague and audacious, because speculation about hybrid forms of analogue and virtual cities is challenging. The shift in attention from the built environment's form to its performance (Batty, 2018), alongside 'the change from atoms to bits' (Negroponte, 1995, p. 4), emphasizes once more understanding the city as a dynamic and interactive process rather than a static built object, this time stressing information as its driving force.

The tension between virtual and physical domains has the potential to drastically change cities' functions and eventually their form, appearance, and the behaviour of their inhabitants. 'Ubiquitous computing' (Weiser, 1994) makes available technologies, such as the internet of things (IoT), cloud computing, artificial intelligence (AI), big data, blockchain, and a digital twin, a dynamic virtual model of the city (Harrison & Donnelly, 2011).

In Chapter 21, titled 'Urbanizing smart cities', Laura Narvaez Zertuche develops a concept of urban artificial intelligence that highlights the relevance of active citizen participation and social and spatial intelligence instead of a primary focus on technology alone.

In Chapter 22, Argota Sánchez-Vaquerizo and Zurera Gómez discuss the complexity of smart cities' sociotechnical systems with a focus on design and use of space with urban digital twins.

The smart city therefore consists of both the physical city and its digital twin. Sensors integrated into buildings, utilities, vehicles, and devices, allow ubiquitous detection and measurement of both conditions and performance of any smart object in its vicinity (Alfa et al., 2018). A strong network with fast transmission capabilities, large bandwidth, and high data capacities interconnects these sensing objects and enables 'machine-to-machine communication across physical space' (Ratti & Claudel, 2016, p. 30) within IoT infrastructure and a unifying cloud computing platform. Urban data is collected and processed in real time. AI performs algorithmic big data analysis (Majumdar, 2018): Data patterns are detected and prediction models provided and simulated for performance assessment. The digital twin allows evaluation and automatic execution or, alternatively, provision of information for human decision-making (Ratti & Claudel, 2016). Self-learning and evolving systems facilitate feedback loops and iterative improvements. Superimposed onto the built environment, such a setup allows perpetual detection of patterns of user behaviour and measurement of urban conditions and performance. With 'atoms and bits joining forces' (Picon, 2015, p. 58), city life-cycles of production and consumption can be synchronized to match real-time supply and demand of critical necessities and services for urban life.

Accordingly, access to and utilization of assets, resources, materials, and energy supplies can be improved and environmental impact reduced by avoidance of emissions, pollution, and waste. Real-time alignment of supply and demand has the potential to improve urban efficiency throughout. Efficient building activity, use, maintenance, and recycling of physical assets can be enhanced.

The integration of life and work in place, and in time can diminish the vulnerability of monofunctional and underutilized districts and building types (Harrison & Donnelly, 2011). Instead of segregation, the integration of users and uses facilitates the provision of multifunctional facilities

that are flexible, adaptable, and shared. This includes complementary urban functions, such as decentralized production of food and fabrication of goods. Smart buildings and smart homes are enabled to reflect the needs of their users and accommodate diverse lifestyles.

Buildings, infrastructure, utilities, and vehicles can also be equipped with technology that enables their operation as 'prosumers' (Gassmann et al., 2019, p. 16) within a power network, not only consuming but also providing local renewable energy production and storage. Autonomous and electrified mobility can be shared and made available on demand. There is the potential to replace the traditional car and to return valuable space to the public that currently is dominated by individual traffic.

The life-cycle stages of buildings of design, construction, operation, maintenance, repair, rebuilding, and recycling are anticipated, and can be monitored and improved. As part of the circular economy, buildings will serve as material storage for future construction. Valuable resources tagged with material passports will be digitally traced throughout their life-cycles enabling their specific reuse and recycling.

The inclusion of city stakeholders in the smart city enables citizen access and participation, engagement, influence, and empowerment (Ratti & Claudel 2016). The use of smartphones provides individual access to the city: augmented reality merges personalized digital content and physical space through displays and allows the simulation of a multiplicity of real and virtual information (Picon, 2015). In Batty's (2018, p. 17) words: 'Physical bonds loosen … the ethereal ones tighten, form no longer will follow function.'

The application of smart technology is often claimed to have the potential to increase the quality of urban life in the face of the many critical challenges to cities and the aspiration to create positive social, economic, and environmental impacts. However, it is worth critically evaluating its potential.

Stokholm Poulsgaard, Vejlgaard, and Lind provide a circular-building perspective on carbon budgeting for architectural design in Chapter 23.

In Chapter 24, Pablo van der Lugt highlights the potential of mass timber building for future-proof cities.

In Chapter 25, Christian Veddeler presents a case of business model innovation for architecture and urban design practices, addressing circular design and the question how to decouple urban growth from finite resource depletion.

In *Smart Cities. A Spatialised Intelligence* Picon (2015) anticipates two main directions of digital urban development: top-down protocols and bottom-up initiatives.

1 Picon (ibid.) identifies a strong tendency of smart city initiatives to increase efficiency, profitability, and control. Top-down protocols determine flows of people, goods, and information within city networks. Smart city data is employed to measure, assess, compare, forecast, adjust, and optimize quantifiable performance parameters. Expert command and control of complex and dynamic processes here becomes the central driver of the smart city. However, the limitations of such hierarchical directives and the exclusive use of information is obvious. It bears the risks of reapplying the functionalist, technocratic, and omniscient attitude towards city planning that Jacobs (1961) criticized so strongly. Any attempt to solve qualitative urban challenges solely with a quantitative optimization of flows would once again misunderstand the complexity of urban life and repeat the provision of simplistic answers for complex challenges that have proven to be inadequate already.
2 The second tendency predicted by Picon (2015) has a qualitative focus and provides the opportunity for bottom-up initiatives and direct interaction of the cities' inhabitants, supported by smart technology. Picon highlights the potential of inclusive empowerment of individuals as key stakeholders of the city. The widespread availability of mobile and smart devices such as smartphones allows a growing number of individuals to access and process information and to engage within digital city networks for direct interaction, participation, and decision-making.

Sennett (2018) rationalizes the contrasting characteristics of both paths the smart city might take by the difference between open and closed systems: Whereas the former enables top-down control through predetermined rules and hidden complexity from the user, the latter allows interactive coordination in a bottom-up logic.

The implementation of smart cities, due to its sizable scope and expenditures, requires long-term planning and the com-

mitment of diverse stakeholders' interests. Forecasting its success is difficult. Next to technological challenges, the success of the integration of digital and physical systems is hard to predict as both have divers life-cycles, require diverse expertise of planning and operations, and entail diverse funding, business models, incentives, and citizen stakeholder interests (Gath-Morad et al., 2017). Smart cities cause disruption and often evoke public resistance. On the one hand, this is because smart initiatives are often commercially driven (Koolhaas, 2014). On the other, concerns are growing about data privacy, ownership, and accessibility. Both the application of intrusive surveillance technology and the practice of commercial data mining have the potential to violate existing privacy laws. Despite the advantages smart cities promise to provide, downsides, like the fear of a 'digital big brother' (Picon, 2015, p. 82), cannot be denied. Authoritarian, exclusive, and specialist directives and technocratic and restrictive command and control are serious threats undermining the very idea of urban life. Cybersecurity is an equally relevant issue, as the failure or manipulation of smart systems, intentionally or accidentally, can have devastating consequences (Gassmann et al., 2019).

Even if the physical form of the city is not yet substantially affected by the digital turn, smart maps seem to anticipate spatial transformation by digital impact (Picon, 2015). Their capacity is to integrate large amounts of quantitative and qualitative information. Such maps reach a high degree of complexity in both space and time. As GPS-driven wayfinding and orientation in an urban environment no longer require the simplicity, regularity, and clarity of the traditional city plan, such maps indicate points of origin for an evolution of smart urban form. Picon's (ibid.) central questions in this context are whether the application of augmented reality allows a new understanding of urban complexity both in physical and digital terms and whether the liberation of the city from the form of its two-dimensional plan will generate a 'truly three-dimensional type of urbanism' (Picon, ibid., pp. 115–116).

Smart cities provide a chance to innovate the city's form, function, and performance (Batty, 2018). Once-established paradigms of city planning are challenged, as habitually employed routines, models, and types that originate from a twentieth-century functionalist agenda have failed to adequately address issues of urban complexity. With the introduction of an additional digital layer, intricacy will only accumulate.

Two criteria for evaluating the smart city paradigm, should therefore be its ability to tackle urban challenges while promoting human-centred urban design to ensure thriving city life.

← Miami Beach (photograph by Rasmus Hjortshøj).

OUTLOOK

A large proportion of our future human existence, the way we live, work, learn, play, and communicate, will take place in–and therefore depend on–future cities. But cities face the disruptive pressures of globalization, urbanization, demographic development, environmental issues, and digital transformation. Although the routines of urban planning have remained mostly unchanged for decades, the demand for future cities inevitably requires appropriate strategies to adapt, with consequences for urban complexity, proximity diversity, density, and ingenuity required. The critical elaboration of current urban discourse in this editorial, alongside the formulation of individual perspectives in the forthcoming book chapters, enable this book to become a transdisciplinary foundation to discuss future cities and city futures.

The goal of this multifaceted discussion is to increase the repertoire of urban design strategies and to envision meaningful environments that are attuned to diverse conditions of life needs, life-styles, and life-cycles. The shift in attention from seemingly omniscient master-planning to human-centred urban intervention indicates a transition from generic models to the factors of specific context and complexity. The aim of improving the quality of urban life requires under-

standing and consideration of manifold interests, agendas, and actors. In the following chapters cities are not regarded as static objects but as dynamic processes that are a complex urban ecosystem of habitat and inhabitant and consist of both physical and to an increasing degree virtual domains.

The following chapters challenge existing notions of urbanization, urban programmes, urban morphology, life-cycles of urban growth and change, and a city's form and performance. Particular attention is given to the ability of future cities to provide meaningful and healthy quality of urban life and a high degree of sustainability and resilience, not necessarily for bare survival but for an evolutionary progression of positive social, economic, and environmental impacts. As a whole, the emerging perspectives presented in this book call for the invention of future cities and speculation about city futures while resisting the temptation of predicting either of them. Instead, the objective is to formulate a transdisciplinary research agenda that contributes to the broad discourse on future cities and city futures.

The prologue section 'Form and Performance' in part is based on research of on one of the authors (Christian Veddeler) unpublished essay 'Smart City: Elements of an ecosystem of supply and demand' (Veddeler, 2020), developed as part of the Operations Management seminar at Judge Business School, University of Cambridge.

REFERENCES

Alexander, C. (1988). A city is not a tree. In J. Thackara (Ed.), *Design after modernism: Beyond the object* (67–84). Thames and Hudson.

Alfa, A.S., Maharaj, B. T., Ghazaleh H. A., & Awoyemi, B. (2018). The role of 5G and IOT in smart cities. In M. Maheswaran, & B. Elarbi (Eds.), *Handbook of smart cities: Software services and cyber infrastructure* (31–54). Springer, Cham.

Aidarova, G., & Aminov, A. (2021). COVID-19–global transition to a new architecture and urban development paradigm of the environment? In *E3S Web of Conferences*, 274, 01008.

Ascher, F. (1995). *Métapolis ou l'avenir des villes*. Editions Odile Jacob.

Augé, M. (1995). *Non-Places: introduction to an anthropology of supermodernity*. Verso.

Baklanov, A., Molina, L. T., & Gauss, M. (2016). Megacities, air quality and climate. *Atmospheric Environment*, 126, 235–249.

Batty, M. (2018). *Inventing future cities*. MIT Press.

Batty, M. (2020). The coronavirus crisis: what will the post-pandemic city look like? *Environment and planning B: Urban Analytics and City Science*, *47*(4), 547–552.

Batty, M. (2021a). *The socially-distanced city: speculation through simulation*. Retrieved May 4, 2022, from https://www.ucl.ac.uk/bartlett/casa/sites/bartlett/files/casa_working_paper_225.pdf

Batty, M. (2021b). Science and design in the age of COVID-19. *Environment and Planning B: Urban Analytics and City Science, 48*(1), 3–8.

Beddoes, Z. M. (2020, June 11). COVID-19 challenges New York's future: cities around the world, take heed. *The Economist*. Retrieved May 4, 2022, from https://www.economist.com/briefing/2020/06/11/COVID-19-challenges-new-yorks-future

Bergson, H. (1911). *Creative Evolution*. Henry Holt and Company.

Berkers, M., De Boer, H., Buitelaar, E., Cavallo, R., Daamen, T., Gerretsen, P., Harteveld, M., Hinterleitner, J., Hooimeijer, F., Van der Linden, H., & Van der Wouden, R. (2019). *Stad van de toekomst: tien ontwerpvisies voor vijf locaties, verbeelding voor een vierkante kilometer stad*. Blauwdruk.

Bereitschaft, B., & Scheller, D. (2020). How might the COVID-19 pandemic affect 21st century urban design, planning, and development? *Urban Science*, 4, 56–78.

Brundtland, G. H. (1987). *Our Common Future: Report of the World Commission on Environment and Development. UN-Dokument A/42/427*. Retrieved April 17, 2022, from http://www.un-documents.net/ocf-ov.htm

Cairncross, F. (1995, September 30). The death of distance: a survey of telecommunications. *The Economist, 30*(9), 5–6.

Calvino, I. (1978). *Invisible Cities.* Harcourt Brace Jovanovich.

CIAM, Congrès Internationaux d'Architecture moderne (1933). *La Charte d'Athènes*. Translated by Tyrwhitt, J. (1946). The Library of the Graduate School of Design, Harvard University.

CSS, Complex Systems Society (2022). *Complex Systems Science*. Retrieved October 22, 2022, from https://cssociety.org/about-us/what-are-cs#:~:text=Complex%20systems%20are%20systems%20where,from%20properties%20of%20the%20parts

Duranton, G., & Puga, D. (2020). The economics of urban density. *Journal of Economic Perspectives, 34*(3), 3–26.

Etezadzadeh, C. (2015). *Smart city - future city? smart city 2.0 as a liveable city and future market*. Springer Vieweg.

EU, European Union (2011). *Cities of tomorrow: challenges, visions, and ways forward*. Retrieved May 22, 2022, from https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/citiesoftomorrow/citiesoftomorrow_final.pdf

Florida, R. (2002). *The rise of the creative class: and how it's transforming work, leisure, community and everyday life*. Basic Books.

Florida, R. (2008). *Who's your city? How the creative economy is making where to live the most important decision of your life*. Basic Books.

Florida, R. (2021). *Remote work, peloton, and online education: What the end of commuting means for cities*. Retrieved September 12, 2021, from https://blogs.lse.ac.uk/COVID19/2021/02/04/remote-work-peloton-and-online-education-what-the-end-of-commuting-means-for-cities/

Frangoul, A. (2017, March 2). The UK's biggest commercial real estate company is making its buildings greener. CMBC. Retrieved November 11, 2022, from https://www.cnbc.com/2017/03/02/the-uks-biggest-commercial-real-estate-company-is-making-its-buildings-greener.html

Friedman, T. L. (2005). *The world is flat*. Penguin Books.

Gassmann, O., Boehm, J., & Palmie, M. (2019). *Smart cities: introducing digital innovation to cities.* Emerald Publishing.

Gath-Morad, M., Schaumann, D., Zinger, E., Plaut, P. O., & Kalay, Y. E. (2016, May). How smart is the Smart City? Assessing the impact of ICT on cities. In *International Workshop on Agent Based Modelling of Urban Systems* (189–207). Springer, Cham.

Glaeser, E. (2011). *Triumph of the city: how our greatest invention makes us richer, smarter, greener, healthier, and happier.* Penguin.

Glaeser, E. (2021). *The 15-minute city is a dead end — cities must be places of opportunity for everyone.* Retrieved May 14, 2022, from https://blogs.lse.ac.uk/COVID19/2021/05/28/the-15-minute-city-is-a-dead-end-cities-must-be-places-of-opportunity-for-everyone/

Glaeser, E., & Cutler, D. M. (2021). *Survival of the city: living and thriving in an age of isolation.* Penguin.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1380.

Hamidi S., Sabouri, S., & Ewing, R. (2020). Does density aggravate the COVID-19 pandemic? *Journal of the American Planning Association, 86*(4), 495–509.

Hardin, G. (1968). The tragedy of the commons: the population problem has no technical solution; it requires a fundamental extension in morality. *Science, 162*(3859), 1243–1248.

Harris, K., Schwedel, A., & Kimson, A. (2016). *Spatial economics: the declining cost of distance. The next big economic shift will reshape industries, social patterns and the global economy*. Retrieved April 17, 2022, from https://www.bain.com/insights/spatial-economics-the-declining-cost-of-distance/

Harrison, C., & Donnelly, I. A. (2011*). A theory of smart cities: proceedings of the 55th annual meeting of the international society for the systems sciences (Hull, UK).* Retrieved April 1, 2022, from http://journals.isss.org/index.php/ proceedings55th/article/viewFile/1703/572

Harteveld, M., & Cavallo, R. (2019). De stad is nooit af! In M. Berkers, H. De Boer, E. Buitelaar, R. Cavallo, T. Daamen, P. Gerretsen, M. Harteveld, J. Hinterleitner, F. Hooimeijer, H. Van der Linden, & R. Van der

Wouden (Eds.), *Stad van de toekomst: tien ontwerpvisies voor vijf locaties, verbeelding voor een vierkante kilometer stad* (189–198). Blauwdruk.

Harvey, D. (1989). *The condition of postmodernity: an enquiry into the origins of cultural change.* Blackwell.

Harvey, D. (2000). *Possible urban worlds: The fourth megacities lecture.* Twynstra Gudde.

Harvey, D. (2020). *Anti-capitalist politics in the time of COVID-19*. Jacobin. Retrieved April 18, 2022, from *https://jacobinmag.com/2020/03/david-harvey-coronavirus-political-economy-disruptions*

Hernández-Morales, A., Oroschakoff, K., & Barigazzi, J. (2020). *The death of the city: Teleworking, not the coronavirus, is making urban living obsolete.* Retrieved April 13, 2022, from https://www.politico.com/news/2020/07/27/coronavirus-cities-evolve-382683

Honey-Rosés, J., Anguelovski, I., Bohigas, J., Chireh, V., Daher, C., Konijnendijk, C., Litt, J., Mawani, V., McCall, M., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. (2021). The impact of COVID-19 on public space: an early review of the emerging questions–design, perceptions and inequities. *Cities & health*, *5*(1), 263–279.

Jacobs, J. (1961). *The death and life of great American cities*. Vintage Books.

Jacobs, J. (1969). *The economy of cities*. Random House.

Koolhaas, R. (2014). *My thoughts on the smart city*. Retrieved April 21, 2022, from https://ec.europa.eu/archives/commission_2010-2014/kroes/en/content/my-thoughts-smart-city-rem-koolhaas.html

Krugman, P. (2011). The new economic geography, now middle-aged. *Regional Studies, 45*(1), 1–7.

Leamer, E. E., & Storper, M. (2001). The economic geography of the Internet age. *Journal of International Business Studies*, 32, 641–65.

Lefebvre, H., Kofman, E., & Lebas, E. (1996). *Writings on cities*. Blackwell Publishers.

Lennon, M. (2021). Planning and the post-pandemic city. *Planning Theory & Practice* (ahead-of-print). Retrieved May 5, 2022, from https://www.tandfonline.com/doi/full/10.1080/14649357.2021.1960733?scroll=top&needAccess=true

Lynch, K. (1954). The form of cities. *Scientific American, 190*(4), 54–63.

Lynch, K. (1960). *The Image of the City*. MIT Press.

Majumdar, S. (2018). Leveraging cloud computing and sensor-based devices in the operation and management of smart systems. In M. Maheswaran, & B. Elarbi (Eds.), *Handbook of smart cities: software services and cyber infrastructure* (31–54). Springer, Cham.

Marshall A. (1920). *Principles of economics*. Macmillan.

Martínez, L., & Short, J. R. (2021). The pandemic city: urban issues in the time of COVID-19. *Sustainability, 13*(6), 3295–3305.

Mazzucato, M. (2018). *The value of everything*. Public Affairs.

McLuhan, M. (1962). *The Gutenberg galaxy: The making of typographic man*. University of Toronto Press.

Mir, V. (2020). Post-pandemic city: historical context for new urban design. *Transylvanian Review of Administrative Sciences*, *16*(SI), 94–108.

Moraci, F., Errigo, M., Fazia, C., Campisi, T., & Castelli, F. (2020). Cities under Pressure: Strategies and Tools to Face Climate Change and Pandemic. *Sustainability*, 12, 1–31.

Moreno, C., Allam, Z., Chabaud, D., Gall, C., & Pratlong, F. (2021). Introducing the '15-minute city': sustainability, resilience, and place identity in future post-pandemic cities. *Smart Cities, 4*(1), 93–111.

Mumford L. (1961). *The city in history: Its origins, its transformations and its prospects*. Harcourt Brace & World.

Negroponte, N. (1995). *Being digital*. Hodder and Stoughton.

OECD (2022). *Cities and Environment*. Retrieved June 2, 2022, from https://www.oecd.org/cfe/cities/cities-environment.htm

Pelling, M. (2020). *Tomorrow's cities and COVID-19: a discussion*. Retrieved April 14, 2022, from https://tomorrowscities.org/tomorrows-cities-and-COVID-19-discussion-0

Picon, A. (2015). *Smart cities: a spatialised intelligence*. Wiley.

Quigley, J. M. (2006). *Urban economics. Berkeley Program on Housing and Urban Policy, Working Paper Series*. Retrieved June 14, 2022, from https://urbanpolicy.berkeley.edu/pdf/QUrbanEcon-Proof082806.pdf

Ratti, C., & Claudel, M. (2016). *The city of tomorrow: Sensors, networks, hackers, and the future of urban life*. Yale University Press.

Raworth, K. (2017). *Doughnut economics: Seven ways to think like a 21st-century economist.* Random House.

Read, S. A. (2005). The form of the future. In S. A. Read, J. Rosemann, & J. van Eldijk, (Eds.), *Future city* (3–17). Routledge.

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Science*, 4, 155–169.

Rode, P. (2020). *Cities on the frontline: managing the coronavirus crisis. London and COVID-19: too complex for one government?* Retrieved April 10, 2022, from https://dossiers.cidob.org/cities-in-times-of-pandemics/london.html#.Xs_2NPi9aqE.twitter

Rosenwald, M. S. (2020, April 7). History's deadliest pandemics, from ancient Rome to modern America. *Washington Post*. Retrieved April 1, 2022, from https://www.washingtonpost.com/graphics/2020/local/retropolis/coronavirus-deadliest-pandemics/

Rowe, C. & Koetter, F. (1978). *Collage city*. MIT Press.

Safire, W. (2009, June 26). On Language: On the mitigation of. *New York Times Magazine*. Retrieved October 25, 2022, from https://www.nytimes.com/2008/01/13/magazine/13wwln-safire-t.html

Salama, A. M. (2020). Coronavirus questions that will not go away: interrogating urban and socio-spatial implications of COVID-19 measures. *Emerald Open Research*, 2.

Sassen, S. (2005). Reading the city in a global digital age: between topographic representation and spatialised power projects. In S. A. Read, J. Rosemann, & J. van Eldijk (Eds.), *Future city* (145–155). Routledge.

Schreiber, F., & Carius, A. (2016). The inclusive city: urban planning for diversity and social cohesion. In G.T. Gardner, T. Prugh, & M. Renner (Eds.), *Can a city be sustainable?* (9317–335). Island Press.

Scott, M. (2020). COVID-19, Place-making and health. *Planning Theory & Practice, 21*(3), 343–348.

Scott, M. (2021). Resilience, risk, and policymaking. In G. J. Andrews, V. A. Crooks, J. Pearce, & J. P. Messina (Eds.), *COVID-19 and similar futures*. (133–118) Springer, Cham.

Sennett, R. (1977). *The fall of the public man*. Knopf.

Sennett, R. (2005). Capitalism and the city. In S. A. Read, J. Rosemann, & J. van Eldijk, (Eds.), *Future city* (114–124). Routledge.

Sennett, R. (2012, December 4). No one likes a city that's too smart. *The Guardian*. Retrieved April 1, 2022, from https://www.theguardian.com/commentisfree/2012/dec/04/smart-city-rio-songdomasdar

Sennett, R. (2018). *Building and dwelling: Ethics for the city*. Penguin Books.

Sennett, R. (2020). *Cities in the pandemic*. Retrieved April 1, 2022, from https://www.publicspace.org/multimedia/-/post/cities-in-the-pandemic

Shenker, J. (2021, March 26). Cities after coronavirus: how COVID-19 could radically alter urban life. *The Guardian*. Retrieved April 28, 2022, from https://www.theguardian.com/world/2020/mar/26/life-after-coronavirus-pandemic-change-world

Sokol, M. (2021). *The post-pandemic city: what could possibly go wrong. GEOFIN Blog #11.* Retrieved May 14, 2022, from https://geofinresearch.eu/blogs/geofin-blog-11-the-post-pandemic-city-what-could-possibly-go-wrong-by-martin-sokol/

Taylor, F. W. (2004). *Scientific management.* Routledge.

Toffler, A. (1970). *Future shock.* Random House.

Toffler, A. (1980). *The third wave*. Pan.

UN, United Nations (2015). *Paris Climate Agreement 2015.* Retrieved May 1, 2022, from https://unfccc.int/sites/default/files/english_paris_agreement.pdf

UN, United Nations (2018). *World urbanization prospects*. Retrieved May 4, 2022, from https://population.un.org/wup/DataQuery/

UN, United Nations (2022a). *Transforming our world: the 2030 Agenda for Sustainable Development*. Retrieved May 23, from https://sdgs.un.org/goals

UN, United Nations (2022b). *Cities and Pollution*. Retrieved April 14, 2022, from https://www.un.org/en/climatechange/climate-solutions/cities-pollution

UNDRR, United Nations Office for Disaster Risk Reduction (2022). *Resilience*. Retrieved May 14, 2022, from https://www.undrr.org/terminology/resilience

UNEP, United Nations Environment Programme (2022) *Goal 11: Sustainable cities and communities.* Retrieved May 2, 2022, from https://www.unep.org/es/node/2037

UN Habitat (2020). *World Cities Report 2020: The value of sustainable urbanisation*. Retrieved April 17, 2022, from https://unhabitat.org/sites/default/files/2020/10/wcr_2020_report.pdf

Veddeler, C. (2020). *Smart city: elements of an eco-system of supply and demand.* [Unpublished Assignment for EMBA7 Operations Management (2019/21)]. Judge Business School, University of Cambridge.

Venturi, R. (1966). *Complexity and contradiction in architecture*. The Museum of Modern Art.

Von Thünen, J. (1826). *Isolated state*. Translated by Wartenberg, C. M. (1966). Pergamon Press.

Weiser, M. D. (1994). Ubiquitous computing. In *ACM Conference on Computer Science*, 418 (10.1145),197530–197680.

Zakaria, F. (2020). *Ten lessons for a post-pandemic world*. W.W. Norton & Company.