Chapter 15

Digitization, automation, operation, and monetization: the changing management of sidewalk and kerb 2000–25

Alanna Coombes[1] and Bern Grush[2]
[1]University of Southern California, Los Angeles, CA, United States; [2]Harmonize Mobility Inc., Toronto, ON, Canada

15.1 Introduction

The footway and kerb are the hottest venues in town. They have hosted centuries of competing actors vying for their use: as a thoroughfare; a vantage point to watch a Panathenaic Procession; the venue for Black Lives Matter (BLM) protests; a place to pay for parking; to meet your Uber driver; or the place to sell the best Kimchee dumplings in Toronto. Footways or pavements have set the stage for urban life for more than two millennia. With the expansion of the virtual world in the 21st century, it seems perhaps remarkable that footways and kerbs have continued to adapt to their audience to meet the needs of their many users. Not only have they continued to be used, but their purposes have diversified and expanded into the 21st century city.

15.1.1 A century of changes at the kerb

A fundamental change for footways and kerbs began on July 16th, 1935 when Park-O-Meter No. 1 was installed in Oklahoma City and the monetization of the kerb began. City free-for-all parking at the kerb began to ebb away as municipal management of kerb space across the globe started to get a grip on this increasingly important, valuable, and complicated city asset. Thus, the right to use the kerb moved decisively toward those with the ability to pay as the free, and democratic use of the kerb became more impractical in growing cities and their increasingly chaotic kerb space.

Monetized kerb space of course is attractive to city councils and not just to reduce local congestion. A municipality may perceive monetized kerb space as an opportunity to fund services or assets although there can be restrictions in practice. In the United Kingdom, for example, parking schemes must be self-financing, and the law does not allow local authorities to use parking enforcement schemes to raise revenue for other services [1]. As the 21st century has progressed, technology has brought greater sophistication to methods of balancing the variety of demands for kerb space and maximizing parking income.

Case study 1—SFPark, San Francisco

One of the more advanced parking systems is San Francisco's commercial parking, SFpark, which provides something of a blueprint for how technology can help to maximize the use of the varying value of kerbside parking across different locations, days, and different times of day. The system uses sensors to collect real-time parking space occupancy data to determine parking rates across the city's thousands of parking spaces. This data is used to determine future parking rates and to inform customers of block-by-block parking space availability.

SFpark points to a number of benefits of their system: increased trade for local businesses (on assessment, sales tax revenues rose over 30% compared to 20% in other parts of the city); a 43% reduction in search time for parking spaces; a 30% decrease in vehicle miles traveled because of less circling to find vacant spaces; a broad reduction of vacant parking spaces; fewer fines or citations for overstaying one's welcome in a parking space (made up for by increased revenue from legitimate parking); better air quality and improved safety [2]. The system uses gradual and regular (at least every 30 days) demand-responsive rate adjustments to find the lowest rate possible to achieve the availability target of one space free per block. The system increases parking prices when parking is hard to find and lowers where demand is low. A review of the system found that circling for parking spaces reduced by 50% [3].

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App-based automated payments are now common in North American and UK cities. With a ticket machine identification number linked to an app parking is easier than traditional meters parking and is swift and paperless. Shopper parking is less necessary as online shopping increases but if town and city centers move from retail provision toward more leisure provision (including restaurants, theaters, bars, or gyms) or service provision (including barbers or nail salons) parking demand by consumers can be expected to continue in city centers. The effect of the online shopping boom is increasing demand for delivery bays, rather than parking bays, including in residential areas or areas of residential and commercial mix.

This growth of online shopping—accelerated during the COVID-19 pandemic—has increased further use of the kerb and competition for space. Smart delivery bays—using sensors and apps—is enabling more efficient use of this increasingly precious resource because it means more vehicles can use it per hour. In some instances, it can also reduce footway clutter as there is less need for machines releasing space for other uses. In the United Kingdom, for example, Appyway has provided Pimlico Plumbers with a solution to the problem that this large plumbing business described as plumbers wasting as much as 20–30 min looking for a parking space in central London and receiving four or five parking fines a day due to lack of availability and having to guess the length of time required for a job—sometimes paying for 4–5 h when the job only took 1 h. This unnecessary time and cost put stress on the drivers and the company finances. Appyway has described their system:

"In July 2015 AppyWay teamed up with Vodafone drivexone to create the world's first 'One Click Parking' solution. Using a combination of M2M dongles and our mobile app we enabled drivers to find available spaces quickly and easily, start a parking session with one click and only pay for the minutes parked. We installed dongles into the diagnostics ports across the fleet, enabling the vehicles to become connected to the internet. The drivers use our app to start the session with one click. Once the drivers have completed their jobs, they simply hop in the car and drive away. The vehicles detect a key in the ignition and a certain distance traveled and the session ends automatically. Drivers then receive a notification with the details of their stay" [4].

Other infrastructure is already competing for the potential space created by redundant ticket machines. The significant increase in electric vehicles and the encouragement of it by governments are leading to a further use of the kerbside charging infrastructure. In the United Kingdom, the number of EV charge points per 100 km of road in the country has increased from 42 in 2011 to 570 in 2019 [5]; there are now 17,948 public charging points [6] in addition to owners' or users' hardware. This reflects the growth in number of electric vehicles, which in the United Kingdom has increased from just under 9000 at the end of March 2010 to 317,000 at the end of June 2020: an increase of 3427% [7]. Currently the more limited battery power limits long journeys, but this problem is resolving as recharging infrastructure across the country grows and battery capacity gets more powerful, enabling more miles to be covered on one charge. This could encourage electric vehicles to travel further and so lessen the need for charging at the kerb, which could provide more opportunities for competing needs for that space, such as pick-up and drop-off space for transport network companies (TNCs—such as Uber).

TNCs or any app-based taxi service has increased the need for pick-up–drop-off zones (PUDOs) in town and city centers. This has brought more activity at the kerb and reduced the availability of parking, which may be less attractive in the short term to a municipality than the revenue-generating parking space. This is changing however as technology now enables drivers to buy small slivers of time—enough for a pick-up or a drop-off or a package delivery. In turn this could provide an incentive for city councils to turn parking at the kerb into PUDO zones—small amounts of time quickly add up in a busy downtown. The first step toward getting the most from a kerbside asset in the short and longer term is to ensure there's a thorough understanding of the kerb space's short and long-term demands, opportunities, and risks, such as double parking. Washington DC took just such an approach to create effective PUDO zones.

Case study 2—Washington DC's PUDO zones

In 2019, Washington DC's Department of Transportation (DDoT) worked on a research project with curbFlow, a mobility company that coordinates commercial operator PUDO at the kerbside in real time. After removing parking spaces to create loading zones for commercial activities at nine locations across the District, the project sought to build on DDOT's efforts to improve the safety of PUDO activity. The results of the project are based on data collected from 6350 commercial drivers representing more than 900 companies who reserved space at the nine curbFlow PUDO locations across the District over 15,000 times during the research period. The zones were used by both commercial vehicles and private vehicles operating in a commercial capacity such as picking up for an online food delivery service or other online delivery platform. The District has reported the following highlights from the project:

- Incidents of double parking and illegal U-turns decreased by an estimated 64% in immediate proximity to the curbFlow PUDO zones.
- On-demand delivery (e.g., online food delivery services), freight, and parcel deliveries lasted an average of 7–11 min, while rideshare and taxi PUDO activity lasted less than two and a half minutes on average.
- On-demand deliveries were the most frequent users of the curbFlow PUDO zones, followed by freight and parcel deliveries [8].

Of course, TNCs and commercial drivers are not the only ones enabled by new technology; car-sharing has also brought new competitors for kerbspace. Cities across the United States have reserved kerbside car-sharing spaces working with companies including Zipcar and SHARE NOW, which is now a market leader with more than 20,000 vehicles and four million customers worldwide. Washington DC started its program in 2005 providing, initially, space free of charge to promote and maximize neighborhood access to these vehicles. As the scheme expanded and a more competitive market emerged in car-share, a market price charge was introduced. Meanwhile, demands from more active travelers have added to the competition for space at the kerb.

The first decade of the 21st century brought shared bike schemes to major cities often requiring docking space at the kerb or footway—with some difficulty in more narrow, European streets. The following decade saw an influx of new mobility competitors—both dockless bikes and scooters (see Fig. 15.1). The menace of abandoned scooters cluttering the footway—or dumped in waterways—emerged, and new mobility companies were forced to engage with local municipalities to stop the footway blight. The mighty Wandsworth Council in south west London simply deemed them pavement obstructions, rounded them up, and dumped them in their depot until the companies took seriously the problems they were causing pedestrians, wheelchair users, and people with strollers. While city councils have wanted to encourage cycling for health reasons and reduce vehicle use for air quality reasons in a competition between them and pedestrians, the footway has generally been prioritized for the latter.

FIGURE 15.1 Dockless in St Paul's: adapting medieval streets to 21st century London.

The focus on walkability, Walk Score [9], and pedestrian access has been a recurrent theme of global cities in the past couple of decades. As cities have acknowledged the importance of pedestrian and cycle movement to well-being, internationally competitive cities have given more priority to active travel. This has been demonstrated in the United Kingdom with the City of London's Transport Strategy of 2019 that prioritized walking and cycling in the Square Mile [10]. This reflects the surge in cycling across the broader London area—a growth of cycling of 229% between 2004 and 2014 [11]. Transport for London has reported that, in addition, during the pandemic, there was a 7% increase in inner London cycling and 22% in outer London (see Fig. 15.2). This is something forward-looking businesses have encouraged because TfL research shows people who walk, cycle, or use public transport to visit their local high street do so more frequently and spend up to 40% more than those who travel by car [12]. Planning authorities that insist on parking infrastructure as part of developments are better able to capitalize on these economic benefits for their city. The City of London's focus on the pedestrian experience is also seen to have important economic consequences as an international financial and business hub seeking to attract the very best in global talent.

While online shopping has reduced the number of shoppers on footways in downtowns increasing attention paid to urban design or placemaking has ushered in higher standards of public realm quality and better footways in cities. San Francisco has been an early pioneer of parklets, piloting its first in 2010. Scores of these mini parks taking up kerb space have since been introduced to the city providing seating and urban greening. Open to the public, these parklets are designed, created, and maintained at the expense of the applicant businesses, business improvement districts, retailers that usually live, work in, manage, or own the adjacent property. They can include tables, seating, bicycle parking, and green landscaping and have been found to encourage walking, cycling, and pedestrian flow by providing seating, cycle parking, landscaping, and public art [13]. The city also found that parklets provide an important buffer zone between traffic and the footway helping to create more serenity and comfort and a feeling of safety. As an outdoor gathering space, they are also seen as encouraging a sense of community, particularly in areas underserved by traditional parks [13]. Space for greening has not just emerged from kerb space but from pavements, sidewalks, or footpaths too.

FIGURE 15.2 Bike hire in the City of London, June 2021.

15.2 Twenty-first century footpaths, sidewalks, or pavements

Urban greening including street trees has helped to make a trip to downtown more pleasurable as well as functional and so enabling the businesses there to compete at least to some extent with online shopping. Importantly though such greening complements the development of town and city centers as places for leisure (see Fig. 15.3) as they move away from a primarily retail function in the face of online competition. The development of downtowns or town centers into centers for leisure (restaurants, barbers, coffee shops, and nail bars) rather than retail (shops) has encouraged a focus on the physical environment and need to upgrade paving, seating, and introduce street art and other means of delighting downtown visitors and shoppers. While all these new additions have brought a better experience for pedestrians, they have also brought pressures to accommodate the new street furniture or greening.

On footpaths, trees and greening can be viewed negatively by highways engineers (who might prefer unimpeded pedestrian flow) and safety officers (who might be understandably concerned with slip hazards of falling fruits or leaves). But there is a recognition of their importance for

FIGURE 15.3 Green wall at London Wall, City of London.

livability and for climate change adaptation (and indeed mitigation) as they help to combat the Urban Heat Island Effect, provide shelter from sunlight, and eat a little into carbon dioxide emissions. There are equity issues at play with greening too; city places subject to historic redlining, which has negatively impacted on the economic fortunes of generations of black Americans, have far less tree cover than city areas that were not, impacting on air quality, availability of shade, and well-being. A Duke University study found a 50% increase in tree cover in Durham, North Carolina, over the last 80 years for those areas not in redlined areas [14]. Such an absence of trees impacts on temperatures: a 2020 study of 108 urban areas in the United States by Portland State University found that 94% of studied areas displayed consistent city-scale patterns of elevated land surface temperatures in formerly redlined areas relative to their non-redlined neighbors by as much as 7°C, part of which is attributable to tree canopy cover [15]. Urban greening can be driven by environmental and equity objectives and perhaps nowhere is this more visible than the footpaths of downtowns, the heart of towns, and cities open to all.

On the central city footpaths, street vendors and the musicians continue to offer their services or talents as they did centuries ago. Today they may be licensed by the local municipality or vetted by the Business Improvement Area (BIA) or District or town center manager—an opportunity for municipalities to raise revenue from licenses while helping to promote a sense of vitality and interest to the street scene.

Encouraging a café culture is almost *de rigueur* in UK towns and cities; the environmentally unconscious might offer patio heaters to enable outside dining in the chill but the environmentally conscious, little blankets. What they take from the city in terms of space to walk they can more than make up for in terms of urban vitality, safety, and sensory interest (see Fig. 15.4).

As the footpaths have been seen to be more important to a city, the maintenance of footpath quality has also been put in the spotlight. Maintenance has been assisted by the increased ease of reporting problems such as broken streetlights or fly-tipping by ordinary city people. Apps that use GPS—such as fixmystreet.com—have enabled people to report problems sending photos and precise geographical locations allowing (if not delivering) quicker remediation. Similarly reporting faulty lamp columns has been made easier through unique QR codes for each to pinpoint the location and enable easier reporting. Such crowdsourced problem identification enables efficiency in public spending and public involvement in the quality of the street scene.

City centers footpaths—especially in major cities—may also need to provide space for bollards or other defensive measures (see Fig. 15.5). While bollards provide security against hostile vehicles in a terror attack, other measures (with appropriate reinforcement) can also be effective—

FIGURE 15.4 Café culture in former road space in the City of London, UK.

such as kerb height, trees, benches, and other street furniture. Finding space for seating and other furniture can be hard though in older cities with narrow pavements, such as in the City of London.

The 2010s also saw the emergence of footway drones competing with other pavement users. Companies, such as Starship Technologies, began negotiating with universities and city governments to allow use of the footway for their robots to make milk, pizza, and other deliveries. By January 2021, Starship Technologies had completed a million deliveries 6 years after the company was founded; the appeal of a contactless delivery service during the pandemic heightening the appeal. Much more detail on this is set out in the accompanying chapter to this. In historic core areas such as the City of London, a planning authority might understandably baulk at having robots compete for footway space and question the utility of them when busy people, reading from their phones, in narrow pathways make for a complicated and potentially dangerous mix (see Fig. 15.6).

15.2.1 Heading toward the autonomous future

Technology is helping to ensure that footways and kerb space remain essential, into the 21st century. The concern is

FIGURE 15.5 Defensive bollards can be a necessity but eat into space at the kerb.

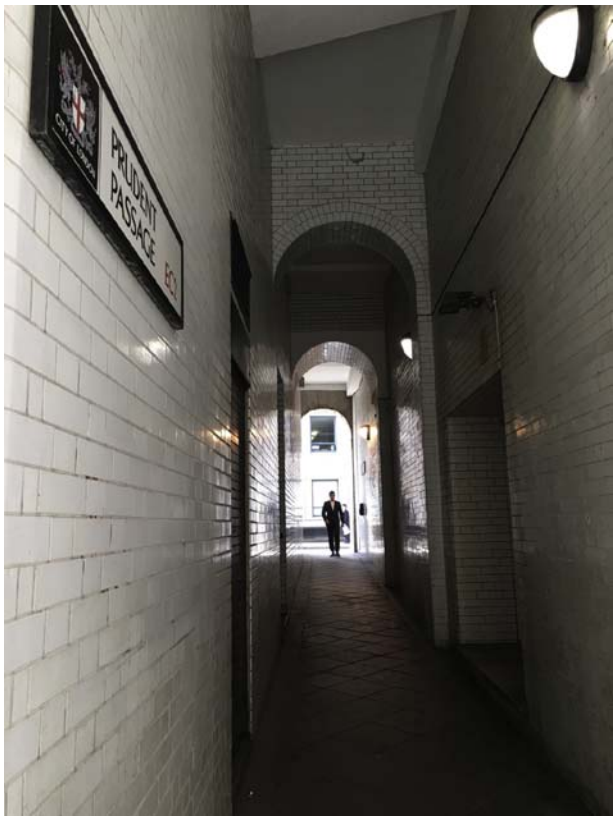

FIGURE 15.6 Awkward: The City of London's maze of passages and walkways where you do not want to meet a robot coming the other way—a not so "prudent passage."

how to manage this increased pressure. As described in Chapter 16, there is much evidence to suggest that sidewalk robots will be in regular use before autonomous vehicles, but urban and transport planners are already thinking ahead to street life with them. Predicting the future can be a futile business but with the many autonomous vehicle trials across the United Kingdom, United States, and elsewhere, there is much research already on how infrastructure or urban form might change as city centers adapt to their widespread introduction. The American Planning Association's Planning for Autonomous Mobility report, for example, provides excellent material [16]. There are also early indications from AV trials that can inform the ways in which cities can work to ensure that the local environment is shaped by the needs of its communities rather than it being shaped by the coming technology.

There seems to be some agreement on a few likely changes with AV introduction. First, that there will be an increase in the demand for pick-up and drop-off zones as there would be fewer reasons to exit a vehicle in a parking structure. All the people who otherwise would be parking their own vehicle would be vying for space to be dropped off may require a kerbside management system such as vehicle-to-infrastructure booking or differentiated pricing for drop-off depending on the popularity of the drop-off point.

We can expect autonomous vehicles to be electric, but advances in battery charging capacity, as described previously, are likely to lessen the need for clunky on-street equipment; trials of other forms of charging (such as embedded in road space) further question the form of future infrastructure needs. We can also see already that automated payment and instruction are likely to reduce the need for signage at the kerb, so we can expect with AVs' advanced technology that their vehicle-to-infrastructure capabilities will lead to a reduction in clutter at the kerb or

on the footway. If all vehicles were autonomous, we could expect signage to become increasingly redundant with some exceptions such as place names.

It seems unlikely however that traditional vehicles will be dispensed with altogether given a country's car culture. Classic car enthusiasts or Harley riders may not wish to have their vehicles adapted for automation, and politically it would seem hard and perhaps foolish to compel them to do so. Some of the claimed benefits of autonomous vehicles such as dispensing with signage or releasing road space (because AVs do not need wide lanes because they do not weave within lanes)—would therefore not be realized. So, the touted wider footways, cycle lanes, or urban greening cannot be relied upon outcomes even if funding was secured. Whatever the outcome, we can assume that there would be a mixed fleet of AV and non-AVs for the foreseeable future.

Some city core parking will continue to be prized for the non-AV driver who will continue to want to leave their vehicle near to their destination. For the AV driver, there will be much less of a need for parking spaces in city cores whether or not they are owned or shared. Shared vehicles could be summoned in the same way as an Uber; privately owned could be sent to a cheaper parking structure away from the center or have it go home and return when collection is required. Of course, privately owned AVs in this scenario would be making double trips, impacting on congestion and the livability of city centers. We can expect that—as has always been the case—as technology becomes mainstreamed, the price reduces significantly, enabling the purchase of it for a wider section of the population.

A key issue with autonomous vehicles is whether they become commonly privately owned or whether they are shared mobility. This difference is what Robin Chase, founder of Zipcar, has described as the difference between the future "heaven or hell" on our roads [17]. This is important because it makes a big difference to the pressure on roads and at the kerb—and in city centers or downtowns more generally because, as described, a privately owned vehicle is more likely to drive empty to go home or to cheaper places to park or circle until its owner has got that email sent. All we can say for sure is that the future ownership structure is uncertain.

A key concern for the future of cities is whether AVs will lead to more vehicles and more Vehicle Miles Traveled (VMT), decreasing livability and adding to congestion. Research suggests we can expect a continued decline in heavy, fixed-route transit use—even without the negative effects of COVID-19. While AVs will enable people who currently cannot drive—the very young, those with disabilities, or those banned from driving—the increase in vehicles and VMT is a worrying prospect.

What is unclear so far is the long-term effects of the COVID-19 pandemic on travel preferences. Continued dislike and distrust of crowded transit are likely to encourage more cycling, walking, and private car use in cities especially if an investment in a bicycle, scooter, or car was made during the pandemic. The cumulative impact could be a less pleasant walking and cycling environment making footpaths and kerb space much less pleasant places to be and could add to pressures to pedestrianize streets.

With an increase in AVs and their VMT, we can expect further pressure on the kerb as they pick up, drop off, make deliveries, or pass through already congested towns and cities. For this to be managed, municipalities will need to decide who or what should have priority use of this precious resource.

15.2.2 Prioritizing space

To ensure efficient use of public space and thriving downtowns, it is important to manage this space thoughtfully and strategically. On the footpath we have seen the various competing uses but how should a municipality or BIA decide who gets priority? Or how do you balance the competing demand for space? For Blomley, his theory of pedestrianism—that the primary purpose of footways is the efficient flow of pedestrians [18]—casts food vendors, protesters, street trees—as impediments to footways' primary purpose. This can create a tension between a municipality's highway team (prioritizing the free flow of pedestrians) and its economic development team (prioritizing local business growth) or a municipal finance team (seeking to maximize its assets and gain a revenue stream through the licensing process). Blomley's theory of pedestrianism is practical while Annette Kim takes a more nuanced view—which is that laws, courts, and maps are social constructions and only have meaning if they are enforced [19]. So, the Christmas carollers, the ice cream van, or the merchandise displays outside the charity shop may well be overlooked in the interests of street vitality and community well-being even if they are obstructing part of the thoroughfare and bylaws require their removal.

Who or what makes use of pathway space is a matter of the rule maker and enforcer understanding and balancing competing needs that are in the best interests of the sustainability and livability of the city? Pathways need to contribute to the well-being of city people at large while providing for those less able. Space is limited; European streets have less scope because they are narrow; so, some sort of prioritization needs to be understood and enforced.

At the kerb, Seattle, WA, has tackled the issue of priority by defining the priority given to the competing users of kerb space (which they call the "Flex Zone") in three categories of districts. Their comprehensive planning process aims to balance competing demands, provide for efficient movement of people and goods, support local economies, and enhance the livability of communities [20]. Priorities differ depending on the surrounding land use whether it is residential, commercial, or industrial. So, for

example, in a commercial or mixed-use district access for commerce takes precedence over access for people—while the reverse is true for a residential district. The priorities in all these districts however conform to the prioritized functions of the Modal Plan, the city's long-term plans for walking, biking, transit, and freight.

This defining of prioritization helps people to understand what is allowed and what is not. A similar process might be necessary on footways because that space too is increasingly under pressure. There are however ways in which that pressure can be alleviated through long-term planning, taking into account the context of footways.

Stretches of pathways should not be looked at in isolation; they should be considered in the totality of the surrounding space. Current and future strategies need to bring into play road space and private property. It may be that road narrowing is the solution to competing needs on the pathway to allow for its widening or that public access could be created by incorporating private space. A Torontonian may not think twice about walking straight through a pathway-level lobby to access a road on the other side—with or without their snowy boots—an idea that might be viewed with disdain in Munich. Such private space merging with public space is increasingly common and sometimes hard to know where one ends and the other begins. This can be mistaken for the privatization of public space but may well be a space that has been private for centuries but through negotiation with the local planning authority has agreed to provide it as public amenity. This "public-isation" of private space, as Matthew Carmona has called it [21], is apparent in the City of London.

Restricted by its narrow, medieval streets, the City of London seeks to carve out open space from ground floor developments to provide much needed seating, urban greening, and through access that is simply not possible otherwise; 122 Leadenhall Street is a good example of this (Fig. 15.7). Sensitivity to cultural norms and local needs and preferences need to be applied—but a broad, strategic view of city space—that takes into account private and public space—makes for better city places.

15.3 Rights to the footway and kerb

The question of who has the right to use space is perhaps a more fundamental question than that of priority. Municipalities and BIAs will have differing approaches to this. A much talked about concept is the "Rights to the City," a somewhat fuzzy concept that is most associated with Henri Lefebvre, who variously and vaguely defined it as, "the right to information, the rights to use of multiple services, the right of users to make known their ideas on the space and time of their activities in urban areas; it would also cover the right to use the center" [22]. To whom such rights belong has been described by Peter Marcuse as, "those who are excluded, the aspiration of those who are alienated; the cry is for the material necessities of life, the aspiration is for a broader right to what is necessary beyond the material to lead a satisfying life [23]." Such rights suggest that city people should not have to abide by municipal kerb rules because they are protected by more fundamental rights if they are one of the excluded many. In practice, applied to the kerb, it would mean access by a more limited number of people but enough to find that the value of kerb space could be destroyed over time.

15.3.1 Property rights

Public space, including the footway and kerb, can be seen as being subject to property rights. While legal ownership or title deeds can be seen as key to establishing such rights, other grounds for legitimate claims could be put forward depending on cultural contexts [19]. Economics is a strong claim: those businesses closest to it may assert stronger claims to its use; they may have duties (such as snow clearance or litter removal); will be more impacted by its use (such as if their customers can park there); and—if the business is a downtown asset—can increase its value because of the convenience of access. This right could be formalized or simply understood because of its proximity to a business or because a sign asks that only its customers park there. Increasingly though all city space at the kerb is formalized, monetized, and subject to enforcement.

FIGURE 15.7 The Leadenhall Building, City of London, where the ground level of the building footprint (framed by the metal pillars) provides public use of a previously closed private space.

The kerb can be seen as a victim of the *Tragedy of the Commons* [24]. A shared resource, in limited supply, if left unregulated, it would be overused and its usefulness potentially destroyed. For example, "free parking" in a town center may sound a very good idea to boost local businesses but if anyone could park there—including commuters who leave their car and get the train into the city—the parking space has absolutely no benefit to the town center and the vehicle merely adds to the already busy streets. For a week this is unhelpful, but not tragic; but over a period of a year, businesses can fail if there is no available parking because it is taken up by people not using the shops and businesses there.

As a resource, there are too many people wanting to use kerb space for parking for cooperation to work and make a Commons resource possible. There would seem to be more scope for a Commons approach to pathways given the amount of space. Indeed, many would consider that pathways are already for open, communal use; but that is not always the case. In the United States, we can see, for example, how to quell Socialist activists in Los Angeles the city amended an 1887 sidewalk obstruction ordinance forbidding, "meeting and public speaking debates or discussion in public streets" without a permit [25]. Other early sidewalk ordinances included restrictions on signage, parades, vending including such as food wagons, or other obstruction by people through loitering [26]. Today monetizing footpaths takes place such as through mechanisms such as licensing for pavement cafés, food kiosks, or markets. So, pavements, sidewalks, or footpaths are not quite a Commons either.

15.3.2 Kerb rights

In contrast to property rights, kerb rights remove the connection of the close business owner who instead would have no more right to that space than anyone else: instead, rights are gained because the kerb space has been rationed, regulated, and often monetized for those with the will and resources to lay claim to it. This is the approach of most cities as described in this chapter, but exploring basic philosophies is important in tailoring the priorities for each city. Such "Curb Rights" [27] are granted, for instance, to buses or jitneys to pull up to the kerb and pick up and drop off passenger while the footway played host to increasing amount of furniture to improve the user experience—bus shelters, seating, and live bus movement updates.

There is a tension between "kerb rights" and "property rights," but both can be at play at the same time. A business owner might be expected to clear snow but may have no preferential treatment as far as use of the pathway and kerb is concerned.

A community's interests as a whole are unlikely to be served if its city center businesses fail for lack of access to customers and residents' employment in (or indeed ownership of) those businesses end for the same reason. Similarly, the value of their property drops because there is no clearly available parking. Some sort of rationing of that space in the interests of the wider community in the longer-term is a necessary response.

15.3.3 Right to the smart city

In planning use of space at the kerb or sidewalk, issues of exclusion inevitably arise. Creating adaptations to enable wheelchair users, strollers, or those with mobility needs to enjoy the benefits of city centers is essential, of course, and usually demanded by statute. Care needs to be taken that those with additional needs or who are unable to make use of the necessary technology are not excluded from the smart city. The barriers may be physical or may be due to low income or other forms of exclusion. Those who cannot afford a phone with the capacity to book a space at the kerb—or who are unable to use such technology—need alternatives if they are to enjoy the benefits others do in their community.

Highly regulated environments, enforced through AI or other technology means, may preclude the willingness to overlook the behavior of those with extra needs. Technology that detects "loitering," for example, may lead to action against those who need time to rest for medical reasons or those perceived not to be sufficiently contributing to the local economy.

Open data and the encouragement of crowdsourced platforms are tools that local governments and BIAs can use to engage the wider community into the development of the downtown or city center. Augmented or virtual reality, for example, can be used to provide a clearer understanding of how imposing a new development would *feel* from the street level. But care would need to be taken to engage those without access to such technology. In part, the answer lies in providing public access to such technology or skills training for those who wish to have it or even recycling of unwanted equipment for those on low income. But there will still be people in danger of exclusion who would need alternative ways to pay for parking, book a parking spot for a home move, or a table at an outside café. Lefebvre's concept of the Right to the City is relevant here—citizens have the right to make use of public space and that space should be shaped around their needs [28].

15.3.4 Is smart, smart?

What can we learn from what has happened with kerb space that might be applied to footpaths as they come increasingly under pressure from sidewalk drones? Perhaps a key lesson is that just because the tech is advanced (such as enabling footpath drones) does not mean it is smart for the city to permit them. The long-term needs of the community are best served through a range of measures including those

aimed at enhancing safety, livability, and local economic prosperity. Allowing one package to be delivered by drone for the benefit of one person is not necessarily in the interests of the local economy as a whole. Similarly, allowing one Amazon parcel to be delivered by motorcar with all the externalities including congestion or poor air quality that it brings is also not smart. Any policy that enables motor vehicles to dominate a city is not in the long-term interests of that city. Vehicles cumulatively create an unattractive scene, drawing the eye away from the possible beauty of the buildings, the landscape, or the people. Vehicle blight is not smart, whatever technology underpins it.

A truly smart city is not one that simply uses new, clever technology to monetize and enforce the kerb space and its rules but is able to take a strategic view of current and future needs that incorporates business, economic, social, community, and environmental needs. Such a calculation would be made with reference to an overarching strategy for the development of an area, which itself should be underpinned with appropriate data, consultation, and ethical and environmental commitments.

15.4 Summary

To thrive we need community, business, and political agreement on who has rights to the kerb and footways. In turn, these rights need to be turned into clearly defined priorities that meet the needs of citizens, including those traditionally excluded, and businesses. Public space, including the kerb and footways, should be designed for community and artistic expression and livability. These vital public spaces—like the city centers in which they exist—need to adapt to the needs of current and future generations, addressing their economic, social, community needs and their well-being.

Finally, let us move on to the real interactive part of this chapter: review questions/exercises, hands-on projects, case projects, and optional team case project. The answers and/or solutions by chapter can be found in Appendix G.

15.5 Chapter review questions/exercises

True/false

1. True or False? The footway and kerb are the hottest venues in town.
2. True or False? A fundamental change for footways and kerbs began on July 16th, 1925 when Park-O-Meter No. 1 was installed in Oklahoma City and the monetization of the kerb began.
3. True or False? Urban browning, including street trees, has helped to make a trip to downtown more pleasurable; as well as, functional, and so enabling the businesses there to compete at least to some extent with online shopping.
4. True or False? Technology is helping to ensure that footways and kerb space remain essential, into the 21st century.
5. True or False? To ensure efficient use of private space and thriving downtowns, it is important to manage this space thoughtfully and strategically.

Multiple choice

1. The question of who has the _____ to use space is perhaps a more fundamental question than that of priority.
   a. Space
   b. Infrastructure
   c. Rules
   d. Material
   e. Right
2. Public space, including the footway and kerb, can be seen as being subject to:
   a. Property rights
   b. Legal ownership rights
   c. Legitimate claims
   d. Cultural contexts
   e. Kerb rights
3. In contrast to property rights, kerb rights remove the connection of the close business owner who instead would have no more right to that space than anyone else: instead, rights are gained because the kerb space has been rationed, regulated, and often _____ for those with the will and resources to lay claim to it.
   a. Regulated
   b. Updated
   c. Treated
   d. Controlled
   e. Monetized
4. In planning use of space at the kerb or sidewalk, issues of exclusion inevitably:
   a. Arise
   b. Decline
   c. Improve
   d. Engage
   e. Conclude
5. The long-term needs of the community are best served through a range of measures including those aimed at enhancing safety, livability, and local economic:
   a. Decline
   b. Delay
   c. Rise
   d. Prosperity
   e. Design

Exercise

Problem

Describe a ground-traffic control standard to address the loading and unloading of ground vehicles at curbs and the operation of robotic devices on sidewalks and at intersections.

Hands-on projects

Project

Do research: Look at why curb spaces have historically been a source of parking revenue for cities, but how the COVID-19 pandemic has accelerated the need for regulating a variety of other use cases, which most cities are not yet equipped for.

Case projects

Problem

How can new mobility contribute to making smart cities more sustainable and connected?

Optional team case project

Problem

Discuss how smart cities will able to manage the huge network of public curbside assets, a list that includes everything from parking signs and bike lanes to fire hydrants and street trees.

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