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The Evolution of Sustainable Mobility and Urban Space Planning: Exploring the factors contributing to the Regeneration of Car Parking in Living Spaces

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Abstract

Strategies and actions to promote sustainable mobility must be based on the characterization of the mobility supply and the promotion of decarbonization policies (e.g. the management of public spaces). The presence of parkings, especially in urban areas, has a significant impact on the occupancy of physical spaces. In this framework, referring to the last decades and the recent pandemic, the paper focuses on the evaluation of influencing factors that have contributed to the changes of planned and designed parking spaces in urban areas. Parklets can support post COVID-19 (Phase 3) pandemics by improving the quality of public space and social distancing close to shops and activities, benefiting from this micro-urban regeneration. Moreover, they can be considered as an extension of the pavement and their implementation can encourage the reduction of private traffic by promoting soft mobility (i.e. walking and cycling). The article defines and highlights the features for the identification and planning of spaces where parklets can be implemented, to improve sustainability and support the post-pandemic recovery.

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1. Introduction

For several decades, a series of strategies have been disseminated to reduce the environmental and acoustic impacts deriving from transport sector. In recent years, the policies of Agenda 2030 and the European Green Deal have been

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proposed to incentivize decarbonization actions and encourage shared and sustainable forms of mobility. On 11 March 2020, the World Health Organisation (WHO) declared the start of the global COVID-19 pandemic. This event had a major impact on several economic sectors, including transport, travel and mobility in general. There has been a sharp reduction in travel, limiting it only to work and the purchase of medicines and basic needs. These restrictions, together with respect for social distances and constant sanitation, have been implemented to safeguard health and contain the spread of the virus. In terms of modal choice, a decline in the use of public transport has been observed due to both on-board restrictions and increasing fear of users, and an increase in the use of private vehicles. Short trips were preferred by the community, mainly on foot or by bicycle (Annunziata et al., 2020). A few months after the pandemic, people increased their use of micro-mobility.

When the COVID-19 pandemic will end, a new mobility condition will be established. Several countries have invested in the planning of charging infrastructures, promoting the spread of electric vehicles (Kaya et al., 2021); the development of forms of shared mobility (Torrìsi et al., 2021a; 2021b) and Mobility-as-a-Service (MaaS) digital platforms (Canale et al., 2019; Torrìsi et al., 2018) towards sustainability. Urban and transport planners as well as transport service companies and local authorities will have to rethink the transport supply to improve relations between people, the economy and the use of urban spaces. In this context, urban and transport planning can represent a tool to develop and optimize the management of urban spaces considering the social distancing and, at the same time, outlining their public nature (Torrìsi et al., 2020).

The organization of the spaces will play a decisive role in directing behaviour towards individualism or sharing; speculation or sustainability. Considering the constantly evolving society, it is necessary to think about the needs of “multipurpose” and “adaptable” spaces. Therefore, it is essential to disseminate sustainable and resilient planning that allows to mitigate the impacts generated by the pandemic and climate change (Tiboni et al., 2021; Moraci et al., 2020; Campisi et al., 2020). The spread of a multidisciplinary vision can allow the definition of universal indicators showing the conditions of the spaces (e.g. street, land, squares, etc.) where people live. For example, the reduction of private vehicles in urban areas can be implemented by inserting limited traffic areas, improving alternative transport services and reusing spaces such as pavements or adjacent parking areas.

1.2 Urban planning and the development of car parking plans in large cities

There is no doubt that car parking planning policies and strategies can support alternative and more sustainable modes of transport.

Starting from the post war period, the increase of car use and parking demand in cities was typically faced by enlarging the existing public parking spaces supply. However, in the last few decades several cities all over the world have set the goal of reducing private traffic and increasing public transport. Furthermore, recent and foreseen trends in mobility patterns, due to the spread of car sharing initiatives, the development of electric vehicles and of MaaS strategies, suggest radical changes in the needs and in the spatial distribution of car parking supplies in urban areas. So, nowadays planning approaches should act on the existing parking supply, optimizing its management and its equipment (like electric charging stations), rather than on imposing new spaces devoted to parking lots.

Urban planners typically set the minimum surface to devote to parking lots for each land use, but those parking requirements represent a tacit policy for automobile use and sprawl (Shoup, 1999; Willson, 1995; Tira et al., 2016). Private parking lots are planned with a minimum standard in most countries, including Italy, where a Ministerial Decree (DM 1444/68) requires at least 2.5 sqm of car parking per inhabitant in residential areas, and a minimum of the 40% of the gross floor surface in commercial areas (now most often raised to 100%). Providing parking lots within private developments should avoid local administrations the cost of those facilities in public spaces.

But, in planning policies, there are some examples where a maximum quantity is fixed by plans instead, so to discourage inhabitants from owning cars. Already in the 70's Boston, Portland and New York city removed minimum parking requirements, and established the so called “parking caps” or maximums requirements in downtown areas (Weinberger, Kaehny & Rufo, 2010). Since the 1990s, Berlin, has had no car parking requirements, except for the disabled. In London, minimum parking standards for residential developments were replaced with maximum standards in the early 2000s (Greater London Authority, 2002). And also, in Italy some recent regional laws are starting to affirm the opportunity to reduce public requirements for car parkings, for example in urban regeneration projects and for urban areas which are characterized by medium-high densities and high public transport accessibility levels (see, i.a., L.R. Emilia Romagna n. 24/2017).

Those approaches to parking requirements, aimed at supporting and fostering sustainable mobility, can also

represent new opportunities for reclaiming and regenerating public spaces, as further explained in the next paragraphs. Within this framework, the main aim of the paper is to define and highlight the features for the identification and planning of spaces where parklets can be implemented, improving sustainability and supporting the post-pandemic recovery. The reminder of the paper is organized as follow: Section 2 reports some main literature references and guidelines on parklets; Section 3 illustrates the selected case studies; Section 4 summarizes the pilot parklets comparative analysis; finally, Section 5 ends the paper with some conclusions and remarks for future research.

2. Urban street experiments: parklets as a system for re-claiming car parking space

Streets were not always planned for the automobile or traffic. Not long ago, streets served especially as public space and in many parts of the world, especially in the developing countries, this never changed. Yet private cars have progressively claimed much of the urban street space and several streets have minimized or even completely neglected pedestrian space (Schönfeld, von & Bertolini, 2017). Nevertheless, the debate on “shared space” has introduced a sort of reversing of this perspective. Urban streets, other than spaces for mobility, are spaces where crucial urban functions and social interactions take place and need to be rediscovered as public space.

Claims to make streets more livable and accessible for people rather than for cars are increasing, often including a reduction or interdiction of motorized traffic or experimenting temporary changes in street use, regulation and form, such as “tactical urbanism” interventions (Lydon & Garcia, 2015), the re-purposing of entire streets or street sections, and even the alternative use of car parking space (Bertolini, 2020). Schönfeld & Bertolini (2017) observe that a variety of uses emerge instantly and spontaneously, without any planning, when the circulation of motorized vehicles is restricted, yet experimentation with small temporary interventions may also be able to promote systemic changes leading to permanent solutions and structured urban strategies.

The *Urban street design guide* (NACTO, 2013) reports a series of street design solutions experimenting the safe coexistence of different modes and playing with space flexibility. One of the proposed solutions is the Parklet, whose purpose is to transform on-street, curbside parking spaces into vibrant and accessible (semi)public spaces (Bertolini, 2020). Parklets are public spaces usually applied to allow sidewalk extension for cafés or street furniture. They are often the result of a partnership between city government and local businesses, residents, or associations, to encourage walking and cycling, foster social interaction and promote economic activities. Parklets have been mainly conceived as a relative “low-cost conversion of small and under used residual spaces, originally devoted to cars, into spaces for the passive or active recreation of people” (UCLA Luskin School of Public Affairs, 2012; Dai, 2012). Parklets are typically raised platforms to the sidewalk level to accommodate simple amenities and equipment like seats, tables, plants and greenery, bike racks, artworks, etc. The possible uses are very versatile, depending on the choices made by the promoters but their main declared aims are to promote walking and cycling, foster social interactions and increase economic activities.

In fact, while parklets are foremost intended as assets for the community, their presence has also been shown to increase pedestrian traffic, and in some cases revenues for adjacent businesses[†].

Parklets are mainly temporary solutions which give the opportunity to experiment new street uses and to test their successfulness in adding value to the public space. Public administrations can eventually make the most effective solutions permanent (Greco, 2012).

In 2005 a parking lot in San Francisco has been occupied for two hours and turned into a public space (an installation by Rebar Art and Design Studio), placing some lawn, a bench, and a tree. Then in 2006 this pioneer installation grew into an annual global event named “Park(ing) Day”, aimed at drawing attention to the lack of green space in the city centre and to encourage the debate on the appropriation of urban space (Littke, 2016; Mays & Gilad, 2018; Birdsall, 2013). This initiative then led to an official urban planning program called *From Pavements to Parks*. The term “parklet” has been first used in 2010, when small movable wooden stages were installed, as part of

[†] Increased bicycle and pedestrian traffic have been observed in post-analysis at numerous parklet installations. A study by the Great Streets Project in San Francisco indicated increases in pedestrian traffic of up to 37% and increases in the number of people stopping and sitting by 30%. Also, the Green Line Café in Philadelphia saw a 20% increase in revenue and the Mojo Café in San Francisco experienced a 30% increase.(NACTO, s.d.)

this program, taking up temporarily one or more parking spaces, often in front of businesses. Despite being sponsored by businesses (mainly cafes and restaurants), residents and community organisations, parklets still remain a public space, as requested by the San Francisco's Parklet Program and guidelines promoted by the city government.

This has been a successful experiment that turned into a city-wide initiative, without generating problems in terms of lack of parking space. The benefits of this intervention include the increase of liveability, social interactions and neighbourhood contacts, an increased walking and cycling activity together with an improvement of economic activities and multifunctionality of the urban space (Herman & Rodgers, 2020). However also impacts have been reported by Littke (2016), Panganiban & Ocubillo (2014) and Pratt (2010, 2011) which comprise the loss of car parking space, no significant increase in profits for businesses, local resistance and competition between businesses, the high costs in terms of money and time for the sponsors who take on a large financial responsibility, the tension between public-private partnership, the risk of privatisation of the public space, the low ecological functionality of parklets.

Table 1 – Parklets design guidelines. (Source: Elaboration from NACTO, 2013)

LOCATION AND SITE	Applied where narrow or congested pavements prevent the installation of traditional sidewalk cafes , or where local property owners or residents see a need to expand the seating capacity and public space on a given street.
SIZE	- minimum width of 1,80 m (or the width of the parking space parallel or angled). - minimum length of 12 m
SHAPE and MATERIAL	Rectangular platform with a slip-resistant surface to minimize hazards.
COMPONENTS and ELEMENTS <i>Cities may opt to have a standard design template to reduce design and construction costs for applicants.</i>	CRITICAL ELEMENTS - wheel stop at a desired buffer distance of 1,20 m from the parklet, to ensure visibility. - vertical elements (posts or bollards) that make the parklet visible to traffic. - elevated platform (with flush transition at the pavement, and with a minimum floor load-bearing weight standard of 488 kg/m ²) RECOMMENDED ELEMENTS - open guardrail (railings) to define the space, no higher than 0,90 m the sub-structure must accommodate the crown of the road and provide a level surface for the parklet. URBBAN FURNITURE - seating, greenery, and/or bike racks.
USES DURATION PERMIT COSTS PROMOTERS	Space for local businesses Generally temporary or seasonal application \$1,000–2,000 (San Francisco Parklet Manual, San Francisco Planning Department, 2013). - administered through partnerships with adjacent businesses and/or surrounding residents , supported by an agreement with the city (in some cases through a citywide application process) - installed and managed by the city as a traditional park or public space. - competitive application process by a city transportation, planning, or public works agency

3. Case studies: city strategies and programs

After the pilot experiences in San Francisco, many other cities in North America experimented the same solution. The governments of many large cities such as Seattle, Philadelphia and Los Angeles (Armato, 2019; Shokry, 2020; Ben-Amos, 2013), but also medium-sized cities such as Fort Lauderdale (Florida) and Burlington (Vermont) have produced guidelines for the sponsors applications. The practice has also spread around the world, especially thanks to the global event of the “Park(ing) Day”, with many cases in Latin America and few European ones. Furthermore, the parklets experiment, born as a bottom-up urban solution, became an increasingly formalised and institutionalised initiative, through cities' planning programs. This paragraph presents a comparison of parklet installations, in particular, the pilot project in San Francisco, as part of the city government program “San Francisco Pavement to Parks streetscape improvements”, and other recent applications in Europe. The comparison considers mainly the pilot projects of recent urban public space implementation programs, in large cities such as Paris, Bern and Wien, but also a singular pop-up initiative in Amsterdam. These cases have been chosen because they provide a useful sample to draw some preliminary reflections aimed at structuring general recommendations for the planning and implementation of parklets.

San Francisco: In San Francisco, after the great success of the Park(ing) Day event, a Parklet Program started in 2010 within the city government *Pavement to Park* program, with the aim of reclaiming public space by converting parking lots into additional sidewalk, dining, and recreation space (Mays & Gilad, 2018; Perkins+Will Consulting Team, 2013). The interventions, supported by the city government, were promoted by local businesses, despite the high costs, to attract users and customers and making more profit, but also to provide new public space for anyone to sit, relax, and enjoy (San Francisco Great Streets Project, 2011).

Bern: As part of the “Pop-up Bern” project, the city of Bern has tried out pragmatic solutions together with the population to create more meeting and leaving public spaces for creative activities. With the “Pop-up Bern” project, the city has enabled residents to imagine new street temporary uses and to take over and design their own living environment, with a quick process and without a building permit (Stadt Bern, 2018).

To start the project, the City of Bern in 2016 temporarily upgraded the central Zeughausgasse, making available and maintaining for two months a series of wooden parklets furnished with stools, benches, tables, bar tables and parasols. In order to meet also the needs of local businesses, the location of the parklets have been carefully chosen.

Paris: The “Urban Folies” Projet 2018-2020 in Paris, in the framework of the project “Paris aux piétons” 2015, proposes the conversion of certain parking spaces into urban laboratories for the public space, drawing inspiration from the concept of “parklet”. The first deployment of the Urban Folies project took place in collaboration with the City of Paris within the framework of the Participatory Budget and the Public Domain program led by Dédale. Five Parisian districts hosted experiments between 2018 and 2020, in close collaboration with local actors (Dédale, 2019). Four pilot parklets has been built in 2019, as an extension of the sidewalk and of the public space, each one dedicated to a particular use depending on the neighborhood main function and vocation (Ville de Paris, 2019).

Wien: The Grätzloase is an initiative implemented jointly by the City of Wien and the Local Agenda 21 Vienna Association to boost residential quality in Wien neighbourhoods (*grätzln*). The Grätzloase action program supports residents and associations who wants to create urban open spaces equipped for children or with parklets. The best actions are supported financially as well as with know-how support in approvals and implementation processes. Between 2015 and 2020, around 380 campaigns, including 220 parklets, have been carried out across Vienna. An interactive map of all the currently equipped parklets is available on the website (<https://www.graetzloase.at/parklets.html>).

Amsterdam: A pop-up initiative has been launched in 2019 by a famous bicycle brand with the support of a creative agency. A mobile parklet has been designed, a pop-up bicycle parking equipped with a roof, wheels, and a legal Dutch number plate. Its first public appearance happened in a famous shopping street in Amsterdam and produced some negative reactions in shop owners, while it was very popular with cyclists and walkers (Mecava, 2019).

4. Pilot parklets comparative analysis

The parklets’ most relevant features reported in the literature, in particular, in the study proposed by UCLA-Luskin School of Public Affairs (2012) and NACTO (2013), have been recorded and summarised. Then, to ensure cross-case comparability, they have been organised in 9 features (location, site & size, uses, components, duration, type and promoters), as shown in Figure 1. The following table (Table 2), then, shows these relevant features identified for each analysed pilot parklets, highlighting the differences and common aspects.

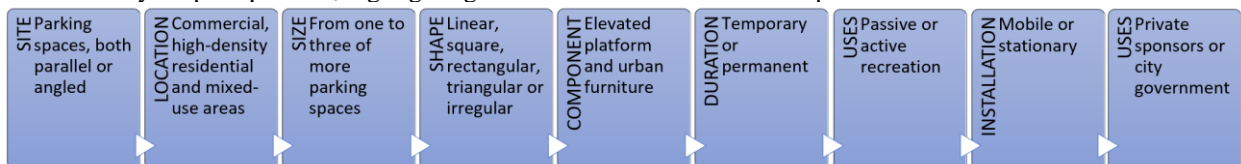


Figure 1 – Selected features for the comparative analysis

Table 2 – Pilot parklets comparative analysis

Pilot	LOCATION	SITE & SIZE	SHAPE & MATERIAL	USES	COMPONENTS & ELEMENTS	DURATION	TYPE	PROMOTERS
San Francisco Divisadero Street parklet	Commercial corridor of Divisadero Street with narrow sidewalks	Width: 2,4 m Length: 2-3 parking stalls	Rectangular wooden platform	Street Café bicycle parking landscaping	Elevated platform with 3 café tables, 10 chairs, 1 bench, 3 bike racks, landscaped planters and solar lighting	2010 Temporary	Stationary	Local business (Mojo Bike Café) and other stakeholders applied to the city, entering a design process with the design partner and City staff.
Bern Zeughausgasse parklets	Zeughausgasse, one of the busiest commercial streets; a very walkable area with a lack of public seating	2 parking stalls of delivery trucks	Rectangular wooden platform	A place to stay, sit, eat and play	Elevated platform with benches, seating, standing tables, moveable chairs, sunshades and planters.	Firstly in 2018 from August to October, then replicated in 2019 and 2020 (re-funded for the next three years 2021, 2022, 2023 in the summer season from April to October)	Stationary	Planned and maintained by the City of Bern's Traffic Planning Department and built by the Civil Engineering Department's carpenter
Paris 1 Travail nomade et terrasse publique	Rue de la Bourse, a street with offices.	1 parallel parking space	Rectangular wooden platform	A place to stay and sit or eat lunch for workers, tourists, citizens	Elevated platform with Tables and seats	Few months. At the end of the pilot phase, it could become permanent on the same site or be relocated.	Stationary	Association "Dédale" founded partially by the city of Paris
Paris 2 Terrasse végétale et nature en ville	Rue de l'Hôtel Saint Paul	2 parallel parking stalls	Rectangular wooden platform	New green space for passers-by and walkers looking for a space to sit and organize activities around gardening. Repairing bicycles	Elevated platform with planters and benches			
Paris 3 Ateliers et réparation vélo	Rue des Quatre Frères Peignot	1 parallel parking stall	Rectangular wooden platform	Repairing bicycles	Elevated platform with a pump for self-repairing bicycles, a movable table and chairs			
Paris 4 : Cultures musicales et animations de quartier	Rue André Messager in a district characterised by musical cultures	1 parallel parking stall	Rectangular wooden platform	New space for cultural or social events: small concerts or meetings.	Elevated platform with planters, benches and a bulletin board			
Wien 1 Drahteselose	Lichtenauergasse 4 Residential street with directional uses, in front of the Radlobby Wien	2 parallel parking stalls	Rectangular wooden platform	Living space + Repairing bicycles	Elevated platform with table, benches, flowers and a bike repair station. equipped with a bike pump, tools and chain oil.	July 2018 – still present (re-funded in 2020)	Stationary	Radlobby Wien
Wien 2 Pustelblume (Dandelion)	Theresiengasse 45 Residential street	3 parallel parking stalls	Rectangular wooden platform	Events and activities point ("Grätzlabends" - neighborhood meetings, gift market, children programmes ...)	Elevated platform with tables, benches, flowers	May 2019 - still present	Stationary	Agenda 21 group MACHBAR! PLATTFORM FÜR INITIATIVEN
Amsterdam	The first public appearance was in the PC Hooftstraat a luxury shopping street.	1 parallel parking stall	Rectangular metal platform	Parking space for eight bicycles	Elevated platform with a roof and 8 bike racks.	2019 – the pop-up parklet has been legally parked anywhere in the city centre. for few hours.	Wheeled platform with legal number plate.	Union, a famous Dutch bicycle brand, and the creative agency Natwerk.

From the study of the noteworthy examples of San Francisco, Bern, Paris, Wien and Amsterdam it is possible to draft some recurring points. First of all, even if most of the initiatives are bottom up and developed by associations, citizens or local businesses, they are all encouraged and supported, in different ways, by the local administrations through dedicated programmes. The intention of these administration is clearly to boost the spread of micro-regeneration projects throughout the city. Considering the design and implementation of the parklet, the most common application involves parallel parking stalls transformed into rectangular elevated platforms. However, looking at the factors that influence the transition from car parking to parklets, it emerges that those factors, as well as the definition of parameters and geometries, are mostly spontaneous rather than planned.

5. Conclusions and further research

The pandemic imposed new rules and routines of social distancing worldwide, so walking and cycling became highly recommended as a safe and environmentally friendly mobility alternatives. Many cities implemented local actions to support walking and cycling through tactical urbanism intervention, i.e. parklets, with the aim of enlarging sidewalks. The spread of parklets could stimulate social interaction by allowing numerous commercial activities to use open spaces, guaranteeing social distancing and to regenerate urban spaces originally viewed as secondary public spaces. In Europe, in most cases these experiments have started spontaneously, in other cases guidelines have been implemented but without an urban planning strategy, relying only on private initiatives. The absence of European guidelines for the planning and design of parklets has led this work to preliminarily investigate the factors influencing the reconversion of parking spaces in urban areas, considering several pilot applications worldwide. Therefore, in this work it has been proposed the realization of a detailed comparative analysis based on several features (related both to infrastructural, managerial and administrative aspects) and the creation of tables to highlight the factors and the way in which they influence the change of urban spaces. The results emerged from the analysis of the pilot applications in the previous table can be then merged with some literature recommendations (Ghandi, 2019; Von Schönfeld, and Bertolini, 2017; Littke, 2016) to draft some guidelines and recommendations for the planning and implementation of parklets. The performed analysis will constitute the basis for future research to be deepened in the design of parklets for the implementation of national and local best practices, leading to the definition of real guidelines for the location and design of parklets.

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