



# Liveable Urban Open Spaces for Health and Wellbeing. Towards the Careggi Campus Landscape Masterplan for Florence University-Hospital

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## Abstract

Spatial fragmentation and congestion have become increasingly apparent in cities, also due to the functional specialization of open spaces. Such phenomena also affect the accessibility of the public realm and therefore urban liveability. With this in mind, it seems necessary to turn public open spaces into dynamic and flexible places that can induce wellbeing and develop a shared identity. Urban open spaces that relate to hospitals and universities play a double role in terms of the specific functions of care, research, learning, innovation, and the overall liveability of the city in which they provide collective services. The ongoing “Careggi Campus” research deals with the case study of Florence University-Hospital as an important part of the broader urban network of public open spaces. In this complex, over twenty thousand people per day use the fragmented and cluttered open spaces, which clearly fall short when it comes to accessibility and liveability. The research aims to produce a landscape masterplan focused on transitioning from a street-based model of mobility and accessibility towards a people-based network of liveable places. In this context, accessibility is a complex driving criterion for landscape design to investigate how the hospital’s open spaces could perform as a high quality network and sustain health by providing wellbeing and fostering lifestyles changes. A main topic of research is how this collective system can host the existing wide variety of permanent functions and spontaneous uses without creating conflict and dysfunction. As the new Urban Sustainable Mobility Plan promotes an innovative vision for public transport, active mobility and intermodal parking lots, rethinking

hierarchies between the active mobility of vehicles and people within the University-Hospital could lead to a sustainable transformation of its landscape.

## Keywords

University-hospital • Urban open spaces • Liveability • Accessibility • Health campus

## 1 Context

Spatial fragmentation and congestion have become increasingly apparent in cities, also due to the functional specialization of open spaces. Fragmentation is not just a key concept in ecological landscape studies, but also in sociological urban ones (Piroddi & Colarossi, 1991; Madanipour, 1999, 2005; Parker et al., 2012; Mela, 2014; Dayo-Babatunde et al., 2019; Kärholm & Wirdelöv, 2019). Fragmentation is also considered with regard to the relationships between single open spaces and the urban landscape (Romaniak et al., 2014; Kilić et al., 2019) and the concept of tissue (Piroddi & Colarossi, 1991), but it also matters at the scale of single open spaces (Carmona, 2010), especially in the urban landscape and with regard to the public realm. The splitting of open spaces into sections with a functional specialization makes each part less than the whole, not just when it comes to the unitarity and expressiveness of its image but also in terms of its ‘breath’ and the related capacities to meet and support different needs and use loads. Such phenomena have affected the accessibility of the public realm and as a result urban liveability. Open spaces are often cluttered, also because spatial congestion caused by objects, signs and signals is added to factors such as the size of vehicles and people flows. With this in mind, it seems necessary to turn open spaces into dynamic and flexible places capable of inducing wellbeing and developing a shared identity. The most visionary, meaningful and effective contemporary experiences include critical proposals by Jan Gehl

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(2010) and initiatives carried out by his agency (Tsay & Gold, 2017). Furthermore, according to Gustafson, Porter and Bowman (2021), research by designing uncluttered and barrier-free places emerges as a key for more healthy and liveable cities: it ‘clears’ spaces, but also fosters non-motorised mobility (Forsyth et al., 2009). Since Buchanan's main work “Traffic in Towns” (MoT, 1963) highlighted the need to tackle the problem of cars in cities many contributions to this issue have been made in scientific discourse and professional practice. Design for sustainable mobility has become relevant and attempts to understand which quality features are needed to encourage walking and cycling and enhance the identity of places in cities while reducing the danger produced by vehicles. Different approaches have emerged to accommodate through design all the functions that streets require from this perspective. “Woonerf”, a term first coined by Niek de Boer in 1965, refers to residential areas where vehicles conform to pedestrian and cyclist rules, and “complete streets” emphasize the need for a comprehensive design for users of all abilities and with all kinds of transportation. Besides, “democratic streets”, in Mark Francis' theory (2016), deal much more with the concept of collective use and social equity, and “shared streets”, as promoted by Hans Monderman, involve the removal of signage for the self-regulated sharing of space among all users and vehicles. This research also provides an insight into this last approach to better explore its implications in landscape design.

## 2 Health and Wellbeing in Urban Open Spaces and in Hospital Spaces

As cities change due to interdependent economic, social and environmental phenomena, their public spaces are both objects and subjects of transition for local, national and international authorities.

The WHO Regional Office for Europe states the importance of public open spaces for citizens' health and wellbeing (WHO, 1997), considering them as resources that can develop and preserve good qualities. In the urban landscape, everybody and everything is connected through open spaces. The accessibility of the whole public realm depends on its outdoor components and their relationships. Life flows through the free open spaces of streets, squares, gardens and parks, reaching other open spaces for specific uses and all public and private buildings. So if the urban network of public open spaces has good properties it can protect health and provide wellbeing, but on the contrary, it may be unhealthy and unable to induce perceptions of comfort. For two decades, the health paradigm has been renewed with rightful concern for the social and environmental features of urban habitats and implications for urban planning processes

to create a city more hospitable for the weakest people and therefore capable of fostering wellbeing among us all (Duhl & Sanchez, 1999). The WHO Shanghai conference (2016) linked health promotion to the sustainable development goals adopted by the UN in 2015 (Kickbusch & Nutbeam, 2021). So the Division of Policy and Governance for Health and Wellbeing of the WHO Regional Office for Europe relates to “five interdependent strategy directions” to implement the 2030 agenda for sustainable development; among them we have considered the statement of intent “establishing healthy places, settings and resilient communities” (Menne, 2018; WHO, 2021b). This requires integrated multifunctional visions and actions capable of dealing with the complexity of such contemporary urban issues and challenges. For instance, if we agree on the importance of dealing with climate change and the related heat-health risks (WHO, 2021a) we must consider the improvement of urban habitat performances as the main topic, that is making landscape transitions that not only create more sustainable buildings but that also have more efficient open spaces to provide essential ecosystem services for hygro-thermal comfort. Such a goal, however, cannot be pursued through a sectoral strategy because it could specialize in open spaces while projects and works should aim to “encourage the multi-use of public spaces and co-existence among citizens” (WHO, 1997). In fact, if on the one hand reducing congestion and providing freedom of action foster liveability in urban environments (Rahman et al., 2015), on the other many studies consider the benefits for people's health brought about by habitats with good quality open spaces. These depend on a set of active factors involving both the presence of trees (Salmond et al., 2016) and biodiversity in general (Brown & Grant, 2005), as well as the use of nature-based solutions (Kabisch et al., 2017), the availability of green spaces (Nutsford et al., 2013; Pietilä et al., 2015; Sugiyama et al., 2018) and more generally sustainable urban environments (Bentley, 2013) and outdoor recreational activities (Mackintosh et al., 2016; Poulain et al., 2020). Other studies identify and assess the benefits of green spaces from a clinical point of view (Schweitzer et al., 2004; Lee & Maheswaran, 2010; van den Berg et al., 2015), a context in which the “Erice 50 Charter” sets out some main topics concerning healthy cities (D'Alessandro et al., 2017). Other scholars focus on design as a tool for health promotion (Jackson, 2002; Springer et al., 2017) and highlight the social benefits of green spaces as levers in terms of their effects on health (Jennings & Bamkole, 2019).

On a related note, wellbeing also emerges as a compass for urban strategies involving open spaces as a resultant of several psychological and physical factors such as thermal comfort (Taleghani, 2018; Dunjić, 2019; Lai et al., 2019; Abdi et al. 2020; Antonini et al., 2020; Gatto et al., 2020),

morphological (Peng et al., 2021) and biological (Wood et al., 2018) spatial diversity, mental perception (Wang et al., 2019), life-course changes (Douglas et al., 2017), accessibility (Francis, 1998; Evcil, 2012; Game Tobias & Batista Ferreira, 2014), walkability effects and options (Abraham et al., 2010; Duwall, 2011; Marcus Johansson et al., 2011), relationships with plants (Ulrich & Parsons, 1992) and the effects of their visibility from indoor spaces (Elsadek et al., 2020).

All the issues mentioned also matter with regard to hospitals and universities with both common and specific meanings, needs, and opportunities. Furthermore, the influence of green spaces on people's health and wellbeing are fully evident in literature from more scientific fields, as can also be argued according to the above cited papers and has been highlighted with specific regard to university campuses (Lau et al., 2014) and hospitals too. In the Campus Forest vision created for the Queen Elizabeth II Medical Centre in Perth, health is core in clinical research and education. The masterplan is based on a powerful set of design goals: "amplifying health and wellbeing; a strong campus identity; cooling campus (reducing the carbon footprint); extending green infrastructure; refuge, respite and active and passive places to meet; and a highly legible public realm linking key places and facilities" (Sharley, 2019).

In such a context, our research focuses on the Florence case study and seeks a framework, items, and first and foremost a cultural approach to a landscape-based masterplan to develop a university-hospital campus on a site that has undergone a century's worth of building densification and fragmentation and shrinkage of open spaces. To tackle this situation, we considered the hypothesis that a network of liveable and attractive places could play a double role in both the specific activities of healthcare, research, learning, innovation, and the overall liveability conditions of the city in which both the hospital and the university provide collective services. With this comprehensive goal in mind, we see accessibility as a driving criterion underlying landscape projects for hospital open spaces capable of sustaining health by providing wellbeing and fostering lifestyle changes. A literature review on designing open spaces for healthcare facilities (Shukor et al., 2012) considers seven key categories: "location and view", "accessibility", "layout and space", "seating arrangement", "planting", "design details", "practical services". They describe the cross-cutting qualities of open spaces, which have meaning everywhere and for everything in the urban landscape, and also of all hospitals, but in the review accessibility to green spaces is considered more for acute care hospitals. Another review indicates accessibility to green spaces as a key quality, but in this case with regard to the features of the spaces (Weerasuriya et al., 2019).

In brief, the main topic of the research is how a public campus can host a wide variety of permanent functions and spontaneous uses of a university-hospital avoiding functional conflicts and dysfunction, providing healthcare and promoting wellbeing also through safe, inclusive and resilient open spaces for a sustainable habitat (UN, 2015).

### 3 'Careggi Campus': The Research Position and Its Ongoing Investigation

The Careggi Campus research deals with the case study of Florence University-Hospital as a specific and meaningful part of the wider and interconnected urban network of public open spaces. More than twenty thousand people per day - patients, visitors, workers, students - use the fragmented and cluttered open spaces, which are barely accessible and fairly unliveable. The research therefore aims to produce a landscape masterplan focused on the transition from a road-based model of mobility and accessibility towards a people-based network of shared places for widespread outdoor liveability. Changing the inner mobility is the main condition to free up space for people and for the hospital to function optimally. At present, several private vehicles access and park in the hospital's open spaces with no real need to do so and occupy space used by people moving about and spending time outdoors, creating many dysfunctional interferences of different flows, also for the mobility of service vehicles.

However, matching the word campus with university-hospital is not a simple issue and it seems useful to pinpoint its meaning. The word implies both spatial features and functional structures as its earliest meaning referred to university settlements in the US. But nowadays it is also commonly used to talk about digital universities and research centres. So the functional dimension of the word 'campus' seems to be the most taken into account, even if the spatial features matter too. Despite this, we previewed the research hypothesis on Florence University-Hospital focused on the network of open spaces (Cristiani & Paolinelli, 2020) with the awareness that they really matter. Some of the following topics identify the concept we are investigating to facilitate an effective master-planning process. Different operators use vehicles to provide services to many buildings in the hospital area, so the campus cannot be considered an urban park due to the presence of several buildings and the related need for services provided by vehicles. The urban canon of the road will not be necessary for service vehicle flows. People will enjoy plant formations everywhere, also from the hospital's interior spaces. So the campus tissue has to be different from that of a common urban district. Furthermore, we have considered some spatial complementary keys for designing: closed/open; barrier/

threshold; homogeneous/heterogeneous; indoor/outdoor; abiotic/biotic; pervious/impervious; shady/sunny; dedicated/shared; able/disable; uncluttered/cluttered; temporary/permanent. Finally, because accessibility also depends on the identity and communication of places, the hospital management should develop and implement an integrated way-finding strategy. Last but not least, sustainability represents a major challenge when it comes to the energy transition of the whole future campus and requires the architectural integration of technologies to preserve open spaces from further soil mineralization and spatial occupation. We shared with the General Management of Careggi University-Hospital a framework covering the implementation of a masterplan over two decades through a step-by-step process of change. This timeframe is meaningful for many environmental and social reasons, one of which seems interesting to mention. Because there has been a hospital on the site for a century, it has mature and senescent trees. Consequently, the campus masterplan could be seen as an urban forestry strategy with a wide planting plan/program: by conserving some existing trees and planting new ones over two decades, the species' different speeds of growth will result in the vegetal heterogeneity of the landscape.

#### 4 Open Space Features at Careggi University-Hospital

Some different needs have to be met in an integrated functional vision that reclaims the fragmented and congested open spaces network of the hospital. At the same time, the common need for wellbeing and ethical health issues requires effective answers.

The settlement covers around 75 hectares and several buildings were developed on it over time with progressive additions and juxtapositions instead of a real overall project. Both patches of countryside and historic architectures interface the urban spaces of the hospital. Many streets cross the length and breadth of the area, affecting the life within it: the spatial canon of the urban road and its uses is everywhere, even if it is not necessary, so much so that congested places are found next to others that are almost completely isolated.

Because the research process challenges the potential of the open spaces, it considers most buildings as unavoidable constraints with regard to their position, surface, height, entrances, safety exits and use. So both the morphometric relationships between buildings and open spaces and the sizes of the latter matter when it comes to investigating the hypothesis of a transition towards a barrier-free, uncluttered, accessible and attractive network of outdoor places on a sustainable campus. At present, the open spaces are inappropriately taken up by private vehicles both moving around

and parked, and by the chaotic distribution of street furniture. A widespread lack of accessibility compromises the availability of spaces for people with motor and/or sensory disabilities. In general, the lack of architectural identity creates discomfort and disorientation. In short, there is a problem with landscape architecture: the open spaces are more the result of many building transformations than places designed for people where expressiveness and properties could fit for promoting wellbeing and health.

Some photos (Figs. 1, 2, 3, 4, 5 and 6) show the current situation of congestion in open spaces and of fragmentation sometimes in really narrow places and a map shows the distribution of users within them (Fig. 7). But in the sections of three street corridors (Figs. 8, 9 and 10) we can also see their potential for spatial transition. Imagining them as empty spaces, the design possibilities reveal free spaces of different sizes, allowing us to understand their real 'breath' and seize opportunities for change to meet a wide range of general and specific needs.



**Fig. 1** Open spaces along Viale San Luca: pedestrians are forced into narrow spaces due to the dominance of the spatial canon of the urban road



**Fig. 2** Viale San Luca: the spatial canon of the urban road is dominant without a real need for it inside the hospital's open spaces



**Fig. 3** Parking areas have been designed as merely useful spaces with no architectural care for the surrounding environmental and social properties



**Fig. 6** The street-scape is a de facto shared place, dysfunctional and uncomfortable because the inner mobility is again more focused on cars than on people



**Fig. 4** Outdoor life everywhere is affected by vehicles and people moving around and spending time in narrow and/or cluttered spaces



**Fig. 5** Pedestrian spaces are often empty as they are barely accessible and decidedly incongruous

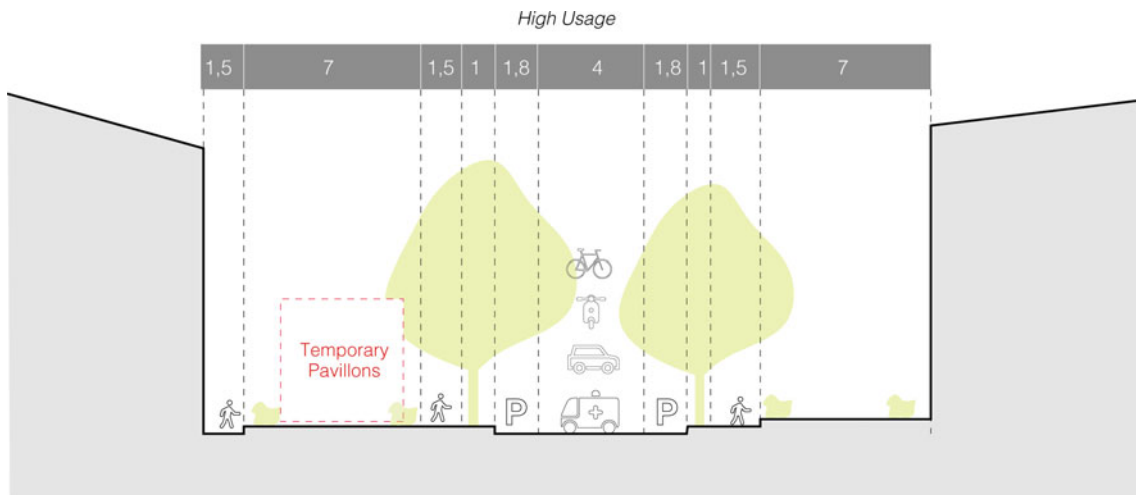
## 5 Early Research Outcomes

A qualitative investigation of users and their daily overlaps provides a design framework for some basic questions. Which users move around and stand about in the University-Hospital collective spaces? What needs do they have regarding open spaces? How are they distributed throughout the spaces of the whole complex and at different times of the day? Users have been gathered into six categories: healthcare professionals, other workers, students, patients, ambulatory or day hospital patients and visitors. These categories have in common the way people use the open spaces, which does not necessarily require vehicles. So the analysis considered pedestrian users to focus on the public realm as a place where relationships can develop. The needs were grouped into six categories: parking, having lunch or other breaks, observing nature, moving around or spending time outdoors, waiting in line for medical services, and celebrating events such as graduation. The study of the distribution of the users' types within the open spaces began with cataloguing and localizing the different services within the hospital buildings. By identifying the distribution of the activities hosted indoors, it was possible to detect how many categories of users overlap in the pavilions. With this knowledge, we studied the indoor concentration of the six categories. The buildings currently abandoned or temporarily inaccessible due to works and the decommissioned or refurbished pavilions have been highlighted.

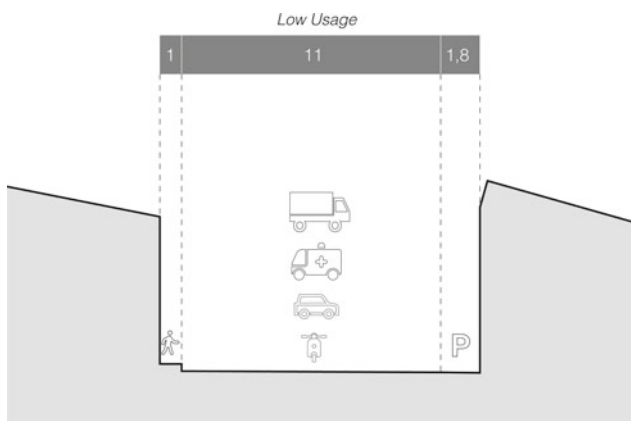
Based on the distribution of users within the buildings, a graphic diagram (Fig. 7) shows the typological density of people's interaction in open spaces: a colour gradient from black to light grey shows where all the categories overlap and those where just one category makes meaningful use of



**Fig. 7** Coexistence of users in the open spaces: dark to light dots indicate the typological density of users (healthcare professionals, other workers, students, patients, ambulatory or day hospital patients and visitors)



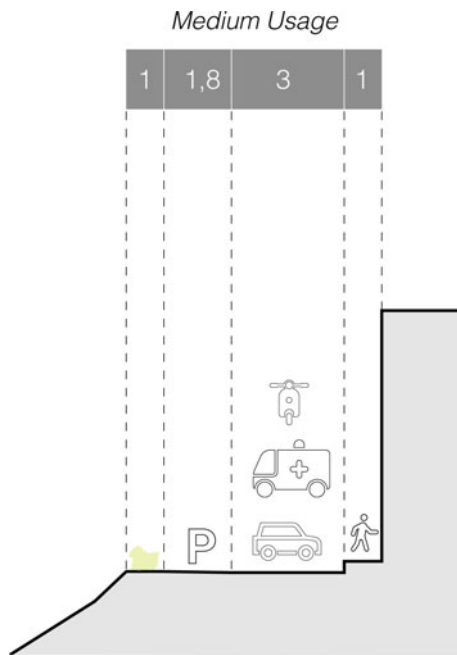
**Fig. 8** A cross-section of Viale San Luca, the main axis of the University-Hospital settlement



**Fig. 9** Cross-section on Viale della Maternità

the outdoor spaces; areas that are currently inaccessible are in yellow. The graphic use of dots aims to communicate the non-infrastructural nature of the open spaces and to portray them as sequences of related places. The map highlights the different presence of users in the southern area compared to the northern one, which is almost completely occupied by a single category of users or at most two.

Seeing how user categories interact led to the articulation of needs within the open spaces with regard to the concentration of people in space and time. The polyclinic currently encourages more use of the open spaces in the southern area than those in the north as they have fewer functions and there are more logistic, technological, technical, and administrative activities. The exception in the northern area



**Fig. 10** Cross-section on Via Lungo il Rio Freddo

is where there is a significant presence of health and university training facilities and research departments.

Moreover, the research studied the streets for a short series of the main features in the spatial corridors: width between the buildings or buildings and open spaces, and also between open spaces; height of the buildings and/or trees; horizontal shapes, regular and homogeneous or irregular and heterogeneous; type of use, pedestrian, cyclist and similar, vehicular; use load, classified into high, medium, low. This study of streets and flows, currently unsupported by numerical data, was conducted through direct observation of the dynamics. It aims to identify the potential degree of space transformation with the main goal of removing fragmentation and functional separation and providing comfortable and efficient spaces to be shared by people and vehicles as a founding principle of the campus vision. It could improve accessibility, functional flexibility and the capability of spaces, also in the future transformations of the hospital often brought about by departments moving from one pavilion to another.

As the new Metropolitan Sustainable Mobility Plan of Florence promotes an innovative vision for public transport, active mobility and intermodal parking lots, rethinking the hierarchies between vehicles and people within the University-Hospital could lead to a sustainable transformation of its landscape. In short, a new framework is needed for mobility to improve accessibility and liveability. So, if a car-free environment effectively promotes health (Nieuwenhijzen & Khreis, 2016), a similar choice is both possible and

called for on a university-hospital campus. On the one hand, the only people that really need to park private cars on the campus themselves are disabled persons. Furthermore, for the latter, it is more important to have little car parks for two-four vehicles well spread and integrated into the spatial tissue, than few wide specialized parking areas too far for good accessibility. On the other hand, the hospital's operational framework requires some vehicle flows both inside the area and outside it. The inner distribution of goods and services could also improve by adopting more silent and smaller electric means, but the flows and how they interfere with the pedestrian and cycle routes requires great improvement, which could be achieved through private mobility management change in a car-free model. The open spaces have become more and more fragmented and congested, and are now dysfunctional; this is a fact, but despite it, analysis and critical thinking about their features and uses reveal good potential for change.

In order to meet the basic needs of people and provide widespread conditions of wellbeing in a liveable urban habitat, the existing open spaces could be converted into a network of uncluttered and barrier-free places with shared paved surfaces and green strips capable of promoting mental and physical health and lifestyles evolutions too.

## 6 Critical Issues

Nowadays there is growing interest in the contribution to healing provided by outdoor spaces in healthcare facilities and a deeper understanding of the need for more integrated functioning between hospitals and cities. At the same time, the notion of an university campus superimposed on the city is being surpassed by a more widespread and interconnected exchange pattern among different cultural, economic and educational services within the urban areas.

These studies result in an overall understanding of the present chaotic and congested mixed-use of open spaces where various needs merge without enough space to be well separated, and streets are heavily occupied by vehicles. So it seems necessary to overcome the typological canon of urban roads moving towards a more inclusive and integrated design of shared spaces for slow flows of people and vehicles and widespread opportunities for staying and parking. As a place of technique, innovation and culture, a university-hospital should be the appropriate context in which to experiment and foster progress in terms of sustainability for health and wellbeing, promoting and driving a cultural transition that could evolve lifestyles and consequently social and individual behaviours in the whole city towards changes to the habitat to better meet human needs.

The ongoing research by design represents a step towards a landscape masterplan for the Careggi University-Hospital Campus. Here a focus is placed on accessibility as a primary and cross-cutting issue through which a series of landscape features can be evaluated and re-imagined to create integration between buildings and open spaces through the sustainable transformation of the latter, also with an urban forestry vision to improve the microclimate, hydrological resilience, sense of place and a wide set of environmental and social ecosystem services. Furthermore, reclamation of the Terzolle Stream could provide a major urban connection for active mobility in a landscape project based on hydraulic features and the dynamics of the water-course and its basin.

Nevertheless, some critical issues emerge with regard to integration between the university-hospital and the city. In fact, it is worth being aware that the primary healthcare functions should not be affected by disturbing phenomena such as overcrowding or noise. While a relationship with the surroundings is desirable in terms of liveability, cultural exchange and the attractiveness of the setting, and social interaction provides significant salutary effects in both patients and visitors, the landscape must convey a need for quietness and psycho-physical wellbeing. Moreover, because of the widespread presence of expensive and fragile facilities within the hospital, the project also has to take into account spatial management and security issues.

The complex functioning of logistics mostly depends on vehicular transportation and so its spatial interpretation is a diriment issue. In order to provide well-structured operational flows, the network of continuous and non-specialized surfaces for mixed-uses must be carefully designed to avoid conflicts and disfunction.

According to a hypothesis of comprehensive design to fulfill all the needs, it is necessary to be both innovative with the new inner mobility and careful with regard to its focus on inclusion. For instance, some disabled patients should always be directly accompanied to the hospital buildings in a vehicle. So a management choice must be made between the options of selected private accesses or shuttle services connecting external parking areas with the departments. This is an example of alternative choices which are both compatible with the structural and functional features of an university-hospital campus if its mobility model enhances accessibility and inclusion by avoiding flows and the parking of generic private vehicles, which is a main critical issue of the present situation. Therefore, some green areas should be left for the exclusive use of severely ill patients who need

rest, silence and privacy but could benefit from healing gardens from a physical, psychological and social perspective. This is an example of the need for open green spaces: the lack of them is a major hazard as over the century the number and size of the buildings have increased. On the one hand within the hospital area, there are disused buildings with large surfaces: meeting the new needs of the hospital or academic facilities by reclaiming them must be an absolute priority to protect the open spaces. On the other hand, they can be more effectively protected by developing their environmental and social functions and making them perceptible through sensitive design and culturally perceived through adequate communication.

In summary, taking into account that the existing settlement is not appropriate for providing healthcare and wellbeing, mostly due to its congestion and fragmentation, a comprehensive and systemic landscape design could improve the quality of the open spaces. Careful critical thinking can drive the design process for the landscape and its development inside the hospital area aiming to change it into a sustainable contemporary campus. At the same time, better integration between the campus and the city is possible and could generate powerful synergies and mutual benefits for quality of life and opportunities inside and outside the campus.

## Credits

The Careggi Campus research is an initiative of the Department of Architecture of the University of Florence and of the General Direction of the Careggi University-Hospital Public Company. The process has been promoted by Gabriele Paolinelli and Saverio Mecca for the University, and by Rocco Damone and Valentino Patussi for the Company. It is coordinated by Gabriele Paolinelli and is being carried out by Francesco Alberti, Nicoletta Cristiani, Giacomo Dallatorre, Lorenza Fortuna, Luca Marzi, Claudia Mezzapesa, Emanuela Morelli, Lorenzo Nofroni, Nicoletta Setola, Antonella Valentini. Several students are providing their collaborations in the Master's Degree programmes in Landscape Architecture and Architecture.

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**Fig. 11** A sample of the ongoing Careggi Campus vision for a network of uncluttered and barrier-free shared open spaces



**Fig. 12** Design sample of the Careggi Campus network of shared places with free paved surfaces suitable for services and vehicles for disabled people with slow flows between people moving around and spending time outdoors: 'breath' and simplicity provide spatial expressiveness, flexibility and accessibility with a comprehensive output of wellbeing

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