

Green Energy and Technology

Adriano Bisello
Daniele Vettorato
Marta Bottero
Dionysia Kolokotsa *Editors*



Smart and Sustainable Planning for Cities and Regions

Results of SSPCR 2022

OPEN ACCESS

 Springer

Green Energy and Technology

Climate change, environmental impact and the limited natural resources urge scientific research and novel technical solutions. The monograph series Green Energy and Technology serves as a publishing platform for scientific and technological approaches to “green”—i.e. environmentally friendly and sustainable—technologies. While a focus lies on energy and power supply, it also covers “green” solutions in industrial engineering and engineering design. Green Energy and Technology addresses researchers, advanced students, technical consultants as well as decision makers in industries and politics. Hence, the level of presentation spans from instructional to highly technical.

****Indexed in Scopus**.**

****Indexed in Ei Compendex**.**

Adriano Bisello · Daniele Vettorato ·
Marta Bottero · Dionysia Kolokotsa
Editors

Smart and Sustainable Planning for Cities and Regions

Results of SSPCR 2022

 Springer

Editors

Adriano Bisello
Institute for Renewable Energy
Eurac Research
Bolzano, Italy

Daniele Vettorato
Institute for Renewable Energy
Eurac Research
Bolzano, Italy

Marta Bottero
DIST—Interuniversity Department
of Regional and Urban Studies
and Planning
Politecnico di Torino
Torino, Italy

Dionysia Kolokotsa
School of Chemical and Environmental
Engineering
Technical University of Crete
Chania, Greece



ISSN 1865-3529

ISSN 1865-3537 (electronic)

Green Energy and Technology

ISBN 978-3-031-39205-4

ISBN 978-3-031-39206-1 (eBook)

<https://doi.org/10.1007/978-3-031-39206-1>

© The Editor(s) (if applicable) and The Author(s) 2024. This book is an open access publication.

Open Access This book is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this book are included in the book's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the book's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

New Technologies and Public Spaces: Supporting Sustainable Urban Policies



Marichela Sepe

Abstract New technologies add value to public spaces if these are used to support the knowledge of a place and its use. The presence of wireless, multimedia support, apps and different ICT tools constitute elements, which can support the knowledge aspects of the place with its different characteristics and can be designed in a logic of integration with other infrastructure and networks in the city. Furthermore, the presence on social media, even if not exhaustive—as the presence of that public space as a background to a photo does not guarantee that it is a pleasant and successful space—offers, however, within a more comprehensive framework of information, data on the type and quantity of users and their perception of it. Indeed, new technologies in their different forms become more and more important tools to provide deeper knowledge of the place, participation, and to address sustainable urban policies. Starting from these premises, the aim of this work, carried out in the framework of the research project “PRIN2020 #20209F3A37”, within the ISMed-CNR Unit with the author’s responsibility and the related Sapienza Università di Roma-ISMed-CNR agreement, is to illustrate the positive influence of ICT tools on the use of both indoor and outdoor public spaces by: revitalizing them; increasing the possibilities of use as well as contributing to greater social cohesion; and supporting sustainable urban policies. By way of examples, two emblematic case studies of public spaces will be illustrated using an original and an ad hoc database.

Keywords New technologies · Sustainable policies · Public spaces · Urban design

M. Sepe (✉)

DICEA, Sapienza Università di Roma, Rome, Italy

e-mail: marichela.sepe@uniroma1.it; sepe@ismed.cnr.it

ISMed, Consiglio Nazionale delle Ricerche, Naples, Italy

© The Author(s) 2024

A. Bisello et al. (eds.), *Smart and Sustainable Planning for Cities and Regions*,
Green Energy and Technology, https://doi.org/10.1007/978-3-031-39206-1_9

1 Introduction

New technologies can add value to public spaces if these are used to support the knowledge of a place and its use. The presence of wireless, multimedia support, apps and different ICT tools constitute elements, which can improve the knowledge aspect of the place in its different characteristics and can be designed in a logic of integration with other infrastructure and networks in the city. Indeed, these can become reasons for major use, socialization, sustainable economic growth and success [1, 2, 4, 5, 15].

Furthermore, the presence of public spaces on social media, even if not exhaustive—as the presence of that space as a background to a photo does not guarantee that it is a pleasant and successful site—offers, however, within a more comprehensive framework of information, data on the type and quantity of users and their perception of it (through, for example, the hashtags used, or comments left).

New technologies in their different forms, hence, become more and more important tools to provide deeper knowledge of the place, participation, and address sustainable urban policies in an inclusive perspective as well.

Accordingly, the NUA—New Urban Agenda adopted in Quito in 2016 during the Third Habitat Conference and which “represents a shared vision for a better and more sustainable future”—focuses attention on the aforementioned topics, as evidenced in the following related principles.

We commit ourselves to promoting safe, inclusive, accessible, green and quality public spaces as drivers of social and economic development, in order to sustainably leverage their potential to generate increased social and economic value, including property value, and to facilitate business and public and private investments and livelihood opportunities for all.

In this principle, the quality and flexibility of the public spaces are related to the presence of multifunctional, healthy and green areas, inclusivity, accessibility, social interaction and inclusion, dialogue between all people, and participation.

We will promote capacity-development initiatives to empower and strengthen the skills and abilities of women and girls, children and youth, older persons and persons with disabilities, indigenous peoples and local communities, as well as persons in vulnerable situations, for shaping governance processes, engaging in dialogue, and promoting and protecting human rights and antidiscrimination, to ensure their effective participation in urban and territorial development decision making.

In the above principle, the attention to the needs of women, girls, children, youth, older persons and persons with disabilities or in vulnerable situations is particularly outlined, in order to support specific attentions and policies to them.

We will promote the development of national information and communications technology policies and e-government strategies, as well as citizen-centric digital governance tools, tapping into technological innovations, including capacity-development programmes, in order to make information and communications technologies accessible to the public, including women and girls, children and youth, persons with disabilities, older persons and persons in vulnerable situations, to enable them to develop and exercise civic responsibility, broadening participation and fostering responsible governance, as well as increasing efficiency. The use of digital platforms and tools, including geospatial information systems, will be encouraged to improve long-term integrated urban and territorial planning and design, land administration and management, and access to urban and metropolitan services [36].

In this latter principle, attention on ICT as a tool to improve responsible governance for all and access to urban and metropolitan services is specifically promoted.

Starting from these premises, the aim of this work carried out in the framework of the research project “PRIN2020 #20209F3A37”, within the ISMed-CNR Unit with the author’s responsibility and the related Sapienza Università di Roma-ISMed-CNR agreement, is to illustrate the positive influence of ICT on the use of public spaces by: revitalizing them, offering many kinds of technical facilities, making them more liveable; contributing to greater social cohesion; and supporting sustainable urban policies, also in the event of emergencies of different kinds. By way of examples, two suitable case studies of public spaces—with particular attention on new technologies—will be illustrated.

The case studies are selected from a series of 30 best practices [30, 31] of public space, which follow the principles of the Charter of Public Space [14]. The Charter was adopted during the second Biennial of Public Space held in Rome in May 2013 and presented during the events organized at the Quito Habitat 3 Conference in 2016, during which many principles were used for the New Urban Agenda discussion concerning quality public spaces.

To verify the validity of the Charter 10 years after its creation, 30 case studies were collected [30, 31, 35], and an ad hoc database was created to analyse them. The Charter is composed of 50 principles that are sort of guidelines for liveable and sustainable public spaces. The case studies that were selected for this paper are the Open Laboratory Project in Bologna and the NOI Techpark in Bolzano.

The paper is organized as follows: the second section is devoted to theoretical questions related to ICT and new *communities of flows*, the third section to the illustration of the original database, the fourth to case studies, and finally the fifth to observations and conclusions.

2 New Technologies and Communities of Flows

There is no clear distinction between different types of networks. Infrastructure networks are the physical subsystem of the city, the venous system that distributes flows for the survival of the socio-anthropoc component and the urban system. These arise from project design and must ensure a satisfactory and efficient level of service to the urban community. These nets are material, not very flexible and highly vulnerable, due to their intrinsic rigidity. In many cases, the presence of the infrastructure marks the limit of the city [7, 8].

If, on the one hand, the effects of physical infrastructure are in some way predictable or at least attributable to comparable phenomena, it is different for virtual, social and cultural networks that open to increasingly large and uncontrollable ecosystems, with intersections and overlaps that mimic real relationships but give life to systems that are not easily controllable [13, 19].

Internet connections, if on one hand, make work relationships, social relationships, etc. easier, on the other hand distance relationships between places and people, creating new (non-geographical) distances [9].

Different infrastructure in the digital city has generated the root of what is now called the “intelligent city” or “smart city”, in which technologies in their many forms are at the service of the city in order to both improve the quality of life of its users and to guarantee sustainability.

Research and practice in the field of infrastructure and urban virtualization, and not only, are today strongly oriented towards the use of smart technologies [4, 10, 11, 22]. The ability to control every action, service, desire, movement from a digital device has the aim of speeding up times and improving results. New spaces in contemporary metropolises are changing their place identity—that can be perceived by physically using the sites—in favour of an identity that can be quickly captured by a smartphone or tablet [26]. More and more sophisticated apps are offered to visitors and common users of places, creating accelerated visions of culture and services.

Furthermore, physical space has today become a counterpart of vital importance for digital existence: the use of networks has led to a different way of conceiving the participation of citizens in the construction process of the territory. Community hubs, network thinking and social media are some of the terms that indicate the current ways of relating to networks by communities [23–25].

Advanced technology infrastructures introduce a new exchange culture by creating new opportunities for interaction within settled communities. Through the innovative contribution of these infrastructures, forms of land use are being reorganized, creating contexts where social exchange replaces those formed over time. The processes are not easily identifiable because the signs that are formed do not always understand the transformations that are taking place.

The interaction between virtual communities and urban places can have different effects. Graham and Marvin [17] observe two elements in particular in this regard: the relationship modalities between virtual communities and the public sphere; the implications of the birth of entirely virtual cities. As Healey et al. [20] asserted “the physical city must be replaced with a virtual urbanity, a city of the mind created by telematics”. “The hope of this new technological revolution is that it will provide the channels through which knowledge and information will be more democratic, dispersed due to the diversity of relational networks in urban regions”. However, there is also the risk that virtual communities could lead to further urban fragmentation and a removal of sociality from urban places in favour of electronic networks and that: “ethnic groups will gather in their virtual communities, that libertarians speak only to other libertarians ... inevitably, the effect will be to demolish local geographic communities and ultimately weaken the entire national community” [3].

Even if this happens, “the widespread adoption of such sophisticated electronic spaces could lead to a further intensification of the separation of the places of the space and blur the boundary between real and simulated, between public and private (...). It is difficult to speculate on the ways in which such changes will affect cities, but there seems to be no doubt that the elaboration of a whole complex of virtual realities within which considerable portions of the urban population will spend considerable

chunks of time, it will alter the ways in which they approach and use the physical spaces of cities and the nature of social interactions” (Graham and Marvin, 2002).

Technologies are in fact restoring dignity to the “place” as a result of the interaction between space and sociality. For this purpose, elements of tangible and intangible heritage are put in place that can contribute to increasing the attractiveness of the city, creating an experiential vision of paths and parts of it. This vision is favoured by the presence of a quality urban environment and a creative class [12]. Smart experiential paths are an example of the use of ICT as tools capable of supporting knowledge of the place through multimedia and interactive devices.

Such virtual communities have the common goal of supporting specialized social groups often separated by geographical distance [16]. In fact, new information technologies allow the generation of networks in a very short time through which urban sociality can exchange information, participate in choices and express consent.

Managing the enormous amount of data coming from the network requires in this regard a revision of planning models and the tools these are implemented with, as well as the definition of new boundaries in order to create adequate practices and protocols to apply them. In this sense, new possibilities arise for territorial projects capable of being in line with the contemporary scenarios of flows and networks in places [7, 19, 23, 24].

The encounter between the different spaces of flows will result in a variety of environments, generating integrated platforms that will redesign connections, hierarchies and development opportunities [33, 34].

Indeed, a spatial configuration capable of favoring complex interconnection should perform multiple functions, namely: facilitate the exchange between the different modes of mobility, even soft; place new functions in infrastructural nodes; ensure the high quality of pedestrian, cycle, river and green paths, to facilitate the presence of more typically urban functions. Furthermore, the more strictly functional aspect should be adequately connected to the high symbolic and cultural quality of the spaces attached to infrastructure nodes, in order to create a sense of belonging and safeguard the identity of the places [27–29, 31, 32].

Blue, green, cycle, pedestrian, experiential, cultural, virtual and multimedia paths can overlap, intertwine and recombine and have the potential to create new mixed urbanities that are more liveable and sustainable.

In this perspective, the project of a place that wants to act as a generator of its cultural armour must be able to propose territorial devices that act on its metabolism by stimulating its social, economic, educational, health and landscape connective functions. In this new dimension, one of the most exciting challenges is design and planning based on the creative multi-dimension of development able to seize the opportunities of the alliance between heritage and creativity, heritage and innovation [6] and heritage and health.

3 Data Collection

To analyze the 30 case studies, and those which will be illustrated in this paper, the QPS-D@taC—Quality Public Space D@ta Collection was created. This is an original database [30, 31] constructed by collecting information, images and planimetries concerning the phases of design, realization, and management of public spaces. Information regarding the success of the spaces in question and their presence—where they are—on social media is also included. Data is collected by different sources, including information from the professionals or technicians who created the spaces, internet websites, bibliographical references, and on-site visits.

The first element to collect is the year of realization; although a project such as a public space is realized in the medium-long term, the year of realization indicates the moment in which it is inaugurated. If, as happened in some cases, the spaces were inaugurated in different phases (e.g., 2010–2013), these were indicated, giving the idea of the different steps in the realization of the sites. The second element is the planimetry of the project and relative images that detail the shape and/or the position of the public space within the surrounding territory.

The third element is the city where the space is located and its address. The fourth element is the measure of the surface area; these data together with its localization have the function to explain, the extent of the project work, and the consequent “urban weight” of the public space in the territory.

The fifth element to collect consists of identifying the institutions involved; these data are useful to comprehend if and what public entities are involved in the process of creating the space and if the private sector is involved. The presence of public entities clarifies the will of local administrations to realize a space that is public and for public use; the contribution of the private sector usually identifies the need for funds in the executive and/or management phases.

Funds are also useful data—the sixth element—which is connected to the previous one because it needs to indicate the whole amount—both public and private—used to realize the public space. Furthermore, in the database, it is indicated if the management cost was forecasted and the amount.

The presence of an urban planning project—the seventh element—, which is the general framework for the realization of a public space, is indicated, explaining if the public space is part of a greater regeneration project, or if the project only concerns the public space area in question. Accordingly, information concerning possible public concessions is reported to understand all the urban planning tools used to realize the public space. The names of the architects or urban designers are also reported if the project is realized by a private firm.

The eighth element consists of identifying the policies, which are carried out for the public space in question, and, as for the previous data, these may concern only the specific site or a wider area if the space has been realized in the framework of a broader regeneration project. The database can comprehend ad hoc policies—for long or short periods—adapted for specific needs, such as for the pandemic.

The ninth element concerns both the kind of uses and fruition of the space (Moriarty and Honnery 2008; Porteous 1977) [27]. This is important information that serves to identify the potential activities that are designed for the public space in question and what are those that are really carried out, and the kind and typology of access points.

These previous data give information regarding the success of the project (the tenth element). Here data concerning the presence of people, the organization of cultural events and the presence of public space on the social media are collected. In particular, data concerning the presence on social media, although not exhaustive, offer an indication—through the kind of hashtags, number of followers and likes, and numbers and kinds of comments—on the typology and quantity of users and on their perception of the site [18].

Finally, the database contains the main bibliographical and website references (elements 11–12) which constitute—together with the information provided by the technicians and professionals involved in different ways in the realization of the case in question—the sources of information on the different public space [30, 31].

4 Two Case Studies in Bologna and Bolzano

The best practices of public spaces that were chosen to verify the validity of the Charter of Public Space 10 years after its creation are based on seven categories, namely: waterfronts (in Pescara, Genova, San Benedetto del Tronto and Palermo), squares (in Catanzaro, Trieste, Catania, Palermo, Siena, Aosta, Perugia, and Termoli), gardens (in Rome and San Donà di Piave), parks (in Milan, Turin, Lecce and Cagliari), open-air transportation hubs (in Scandicci, Naples and Padua), nature paths (in Trento, the River Nera and Val di Sella) and projects on spaces in which the use of ICT tools support and improve different uses (in Bolzano and Bologna). The general framework that emerges from the 30 collected case studies shows different design, planning, cultural, geographical, social and financial factors that can determine the quality of a public space [30, 31].

As mentioned previously, the two case studies concern the Open Laboratory Project in Bologna and the NOI Techpark in Bolzano.

The first case study is the Open Laboratory Project realized between 2016 and 2018 in a 2000 m² surface in Bologna within an area located between Palazzo Re Enzo, Sala Borsa (Fig. 1), Palazzo D'Accursio and the former Galleria d'Accursio.

The Institution involved was the Municipality of Bologna and the funds were 3 million euro from the POR FESR [11]–2020—AXIS 6—devoted to *Attractive and participated cities involving the main cities of Emilia Romagna*.

This space was part of the framework of the redevelopment program approved by a municipal council resolution. Different kinds of policies were activated, namely: physical restoration and functional and technological ones. In the first case, the spaces were all connected to each other through a covered path obtained by rearranging the old underpasses and using the square in Sala Borsa and the courtyards of Palazzo



Fig. 1 Bologna, Sala della Borsa entrance (*Source* Marichela Sepe' archive)

d'Accursio. The new public space is a place of connection, contemporary, comfortable and usable in any climatic situation by citizens and tourists. In the second case, the containers were joined together through appropriately equipped spaces with a view to creating a single “open laboratory” devoted to the interactive use of cultural heritage and creative collaboration between citizens, the administration, associations and businesses.

The kind of uses are many, the basic idea is that this public space provides a meeting place and for socialization first of all, but also to a set of spaces for technical laboratories and meeting rooms.

The different Labs Spaces with the support of the ICT are in fact places well equipped and connected to each other, with a strong coordinated image. These are spaces—the gallery, boulevard, house, studio and atelier—suitable for welcoming the public. The aim is to make information and activities easily accessible and experiment with technologies and software, with tables for collaborative work and tools for presentations and sharing information, spaces to manage moments of aggregation and spaces for meetings and audio–video equipment for amplification and streaming of meetings and videoconferences.

In particular, the part called “The Atelier” is an educational and workspace that hosts group activities and where everyone can learn about changes to Bologna and become a sort of key player in imagining its evolution.

Using the interactive table, it is possible to plan solutions to transform public spaces in the city by combining words and images in an activity inspired by the game “Plus and Minus” by Bruno Munari. Furthermore, case studies of urban regeneration in Bologna, Italy, Europe and around the world are displayed on the walls with a database of materials to enrich the project design from a technical point of view to learn more about the regeneration of public spaces.

These data can also be accessed through BOforAll, a free and inclusive app that helps people discover Bologna’s historical centre, with attention to people with physical, visual and auditory disabilities. The intention is to intertwine the production of innovative intangible services and the offer of consolidated cultural services, namely, the library, exhibition venues and cinemas.

There are many elements that testify to the success of the case study. The spaces are used frequently by people of all ages and abilities for different uses and, thanks to the covered path, these are also used on days with unfavourable weather conditions [37].

Furthermore, there is a wide presence on social media which concerns: Instagram page with 1224 followers, Facebook page with 9250 followers and Twitter page with 11,700 followers.

On these social media pages, most of the content is related to the activities of the Laboratories, which, with the help of new technologies, make knowledge of public space and its heritage more accessible and inclusive, supporting socialization across people of different ages.

The second public space project is NOI—Nature Of Innovation—Techpark, which was realized between 2015 and 2017 and inaugurated in 2017. NOI Techpark is located—with a surface of 120,000 m². (190,000 m³)—in South Bolzano in the former metallurgical area “Montecatini”, later known as “Alumix” (Fig. 2).

The property is public—owned by the Province of Bolzano—and the Institutions involved in the creation of the space were the Autonomous Province of Bolzano and BLS (Business Location Alto Adige), which then merged into IDM Südtirol and now NOI spa.

The Institution involved in the space management is NOI spa, while as regards the funds, recovery, renovation and restoration of two processing plants and a building, construction of the new building and the underground garage as well as the realization of the indoor public spaces and part of the special furnishings had a total cost of 64,171,570 euro. These funds came from the Province of Bolzano and to a small extent from the ESF.

The urban planning tools of reference are the PUC—Urban Planning Municipal plan—Areas for supra-municipal collective facilities and the architectonic and urban design was realized by Chapman Taylor Italia (Milan) and Studio CLEAA (Claudio Lucchin e Architetti Associati, Bolzano), with Andrea Cattacin (Trento).

The policies that were activated include: strengthening the innovative potential of the area with the fundamental use of new technologies, supporting local companies in the field of research and development, intensifying international contacts in the South Tyrol economy to create job opportunities and attract highly qualified personnel. The NOI Techpark Südtirol/Alto Adige plays the key role of an innovation



Fig. 2 Bolzano, NOI Techpark, public space (Source NOI Techpark)

centre, capable of connecting small and large companies with start-ups and research institutes, offering space for the most advanced research and the most innovative companies connected to particularly attractive public spaces which play the role of collectors among the scientific laboratories.

There are different types of uses including researchers, students and companies who work closely together to create innovative solutions. To this end, the NOI Techpark provides them with laboratories and workshops equipped according to the most advanced standards. By taking advantage of the infrastructure offered the numerous innovative services and the public spaces companies join the NOI network and benefit from the exchange of knowledge and technologies between the research sector and the economic sector within an attractive and innovative environment created for all the people who work or live there. Companies also have the opportunity to rent laboratories and spaces for production use or to settle permanently within the technology park to create a place to work and socialize.

There are many elements that testify to the success of the case study. The hub is home to 25 Italian startups, 5 research centres, 30 companies and 20 laboratories. These companies include Huawei, Maccaferri, Grandi Salumifici Italiani, Leitner, while several laboratories have been installed at the disposal of companies and research institutes. The space works mainly on four thematic areas: Green, Food, ICT and Automation and Alpine Technologies. The area, not far from the city centre, has been transformed into an innovation district with research laboratories, a nursery, an outdoor arena for cultural events, a park, this is a space that has been returned to the city and its users which is still growing and will welcome new laboratories in the next 2 years—six other modules—and public spaces. Furthermore, the Techpark is fully usable and accessible to all people [38, 39]. The presence on social media

is extensive and includes: Instagram #noitechpark (hashtag and place) with 4631 followers, Facebook US techpark (place and page) with 2802 followers and 2713 likes, and the #noitechpark hashtag on Twitter.

As testified by the use of this place by people and social media content, NOI has become a centre of both cultural and technological interest, which has improved socialization between people, researchers and companies thanks to the appeal of its environment made up of laboratories and public spaces and is well integrated in its social and urban tissue.

5 Observations and Conclusions

New technologies—as demonstrated by the two case studies—give new possibility of use within public spaces—both indoor and outdoor.

Indeed, the use of public spaces should be reconsidered in this direction. Access to networks in squares, streets, parks and the possibility to use multimedia tools in both indoor and outdoor space have made it possible to increase the appeal of places. Recent studies relating to the influence of the Internet in indoor and outdoor public spaces [21] show how it has expanded their use by revitalizing and repopulating them, improving their security and also contributing to greater social cohesion. The presence of multimedia content is a further element that extends the use of public spaces, creating the possibility to learn about the history of places, but also about the available services and equipment, or giving the opportunity to respond with a message to questions or comments placed on ICT supports, helping to increase interaction between users and places. Furthermore, being able to have access to multiple types of information favours possible exchanges of ideas among the users of the places, affirming the public function of the space.

The two case studies that were illustrated were realized in this perspective, namely, to facilitate knowledge with the use of ICT, creating or enhancing public spaces, improving social cohesion and finally the economy.

In the case of Bologna, the different Labs Spaces with the support of the ICT are places specially equipped and connected to each other with a strong coordinated image. The gallery, boulevard, house, studio and atelier welcome people with the aim of making information and activities easily accessible and experimenting with technologies and software such as BOforAll, which is an inclusive app that helps people to discover Bologna's historical centre, with attention to people with physical, visual, or auditory disabilities.

In the Bolzano case, the presence of many laboratories and research centres in an attractive environment made of contemporary open-air public spaces has improved its use, becoming a centre of both cultural and technological interest which has increased socialization between people, researchers and companies thanks to the peculiarity of the site constituted by a “space for science” and “spaces for free time”, that are well integrated in Bolzano and its provincial, social and urban tissue.

The database used to collect the data related to the case studies was very useful in this sense because it identified the presence of public institutions at different levels, the policies and uses and the success of the new public spaces in which the use of ICT is an important factor.

Although in the COVID-19 period of major social restrictions, those spaces were used less they are reference spaces in their cities for socialization and activities, and the use of ICT has facilitated the exchange of information of many different kinds among all people. Indeed, these places are easily accessible by people at different hours improving the sense of belonging to them.

The lesson to be learned from these two cases is that socialization, knowledge as well as the economy can mutually be reinforced if suitable public spaces and uses of new technologies are integrated.

Future steps in this study concern an update to the Charter of Public Space which will include new principles related to the use of ICT to improve the quality of public spaces specifically devoted to knowledge and research, and the suitable use of social media to share the degree of satisfaction of a place, or to communicate possible unexpected risks and the relative measures to follow.

Acknowledgements Financial support from the Italian Ministry of University and Research (MUR) in the framework of the Project PRIN2020 #20209F3A37 is gratefully acknowledged.

References

1. Amin A, Graham S (1998) Cities of connection and disconnection. In: Allen J, Massey D, Pryke M (eds) *Understanding cities: movement and settlement*. Open University Press, USA
2. Anderson Benedict R (1991) *Imagined communities: reflections on the origin and spread of nationalism*. Verso, London
3. Brown J, Barber A (2012) Social infrastructure and sustainable urban communities. *Proc Inst Civil Eng-Eng Sustain* 165(1):99–109
4. Campbell T (2012) *Beyond smart cities. How cities network, learn, and innovate*. Earthscan Publications, London
5. Carmona M, Heath T, Oc T, Tiesdell S (2010) *Public places-Urban spaces*. Architectural Press, Oxford
6. Carta M (2014) *Reimagining urbanism*. List Lab, Trento
7. Castells M (1989) *The informational city*. Blackwell, Oxford
8. Clementi A (1997) L'ambiguo impero delle reti. In: Desideri P, Ilardi M (eds) *Attraversamenti. I nuovi territori dello spazio pubblico*. Costan & Nolan, Genova-Milano
9. Desideri P (ed) (2001) *Excitey. Spazi esterni e reti della nuova metropoli*. Meltemi, Roma
10. Duany A, Speck J, Lydon M (2010) *The smart growth manual*. McGraw-Hill, New York
11. de Waal M (2014) *The city as interface. How digital media are changing the city*. NAI010 Publishers, Rotterdam
12. Florida R (2002) *The rise of the creative class: and how it's transforming work, leisure, community and everyday life*. Perseus Book Group, New York
13. Frederick HH (1993) *Global communication and international relations*. Wadsworth, Belmont, CA
14. Garau P, Lancerin L, Sepe M (2015) *The charter of public space*. LiST, Trento
15. Gehl J (2010) *Cities for people*. Island Press, Washington

16. Graham S, Marvin S (2001) *Splintering urbanism: networked infrastructures, technological mobilities and the urban condition*. Routledge, London, New York
17. Graham S, Marvin S (2002) *Città e comunicazione*. Baskerville, Bologna
18. Huai S, Van de Voorde T (2022) Which environmental features contribute to positive and negative perceptions of urban parks? A cross-cultural comparison using online reviews and Natural Language Processing methods. *Landsc Urban Plan* 218
19. Hall P, Preston P (1988) *The carrier wave: new information technology and the geography of innovation 1846–2003*. Unwin Hyman, London
20. Healey P, Cameron S, Davoudi S, Graham S, Madanipour A (eds) (1995) *Managing cities: the new urban context*. Wiley, Oxford
21. Hampton KN, Livio O, Sessions LF (2010) The social life of wireless urban spaces: Internet use, social networks, and the public realm. *J Commun* 60(4):701–722
22. Hatzelhoff L, Humboldt K, Lobeck M, Wiegandt C (ed) (2012) *Smart city in practice. Converting innovative ideas into reality*. JOVIS Verlag, Berlin
23. Keith NH, Livio O, Goulet L (2010) The social life of wireless urban spaces: Internet use, social networks, and the public realm. *J Commun* 60:701–722
24. Kaika M, Swyngedouw E (2010) The urbanization of nature. Great promises, impasse, and new beginnings. In: Bridge G, Watson S (eds) *New companion to Urban studies*. Wiley/Blackwell, Oxford
25. Kaika M, Swyngedouw E (2000) Fetishizing the modern city: the phantasmagoria of urban technological networks. *Int J Urban Reg Res* 24:120–138
26. Ratti C (2014) *Architettura open source*. Einaudi, Torino
27. Sepe M (2013) *Planning and place in the city. Mapping place identity* London. Routledge, New York
28. Sepe M (2015a) Reti di luoghi, paesaggi delle tecnologie e nuove connessioni. *Crios* 10(2):69–80
29. Sepe M (2015b) Improving sustainable enhancement of cultural heritage: smart placemaking for experiential paths in Pompeii. *Int J Sustain Dev Plan* 10(5):713–733
30. Sepe M (2020a) *Spazi pubblici nella città contemporanea*. Inu Edizioni, Roma
31. Sepe M (2020b) Regenerating places sustainably: the healthy Urban design. *Int J Sustain Dev Plan* 15(1):14–27
32. Sepe M (2022) *Designing healthy and liveable cities. Creating sustainable urban regeneration*. Routledge, London and New York
33. Sokolowski JA, Banks CM (2009) *Principles of modeling and simulation*. Wiley, Hoboken, NJ
34. Swyngedouw E (1993) Communication, mobility and the struggle for power over space. In: Giannopoulos G, Gillespie A (eds) *Transport and communications in the New Europe*. Belhaven, London
35. UN Habitat (2013) *Global public space toolkit from global principles to local policies and practice*. United Nations Human Settlements Programme, Nairobi
36. <http://habitat3.org/wp-content/uploads/NUA-English.pdf>
37. <http://www.fondazioneinnovazioneurbana.it>
38. <https://noi.bz.it/it>. Accessed 2 July 2023
39. <https://www.wired.it/economia>. Accessed 2 July 2023

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

