Sustainable Mobility Planning in Bologna: Towards Resilient Cities Between Climate Change, Health Emergency and Social Challenge

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Figure 1. Portici arcades in Bologna. © Chiara Ravagnan, 2019

Figure 2. Bologna, Central Station. © Chiara Ravagnan, 2019

Bologna Between Quality of Life and Resilience

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Attractive, sustainable, inclusive: from the peaks of the Apennines to the wide horizons of the plain, from the amazing historical heritage to its 60 km of marvellous arcades (Figure 1), Bologna, recognised also as a UNESCO Creative City since 2006, preserves its cultural roots without fearing modernity, always ready to welcome new residents, workers, students, and visitors. As a cosmopolitan urban area, Bologna can manage the coexistence of a grassrooted population with thousands of young people who choose the metropolitan area every year to study in the oldest university in the Western world. It is a metropolitan context where cultural industries play a primary role for the wealth of the community and where creativity and innovation are key tools for social and economic development.

Bologna is also a multi-scalar crossroads in the core of the main southern continental rail and motorway systems (Figure 2). Their connections with the European corridors insert the city in the network of international exchanges. At the same time, Bologna is a model for local sustainable planning combining mobility innovation, environment protection, and public space conservation. Furthermore, it is a relevant welfare actor, firstly as a service provider and then as a promoter of local and territorial development, pursuing and practicing different forms of governance that have gradually opened up to the territory in its metropolitan dimension through agreements, municipality associations and, finally, with the 2015 establishment of the Metropolitan City that replaced the Province founded in 1951.

Ultimately, Bologna and its metropolitan area can be considered a paradigmatic case of a thriving community, a surprising cradle of policies, plans, and projects conceived, developed and implemented following the idea of an emerging identity as a 'small metropolis' based on resilience, cohesion, attractiveness, and connectivity to be pursued through the construction of innovative tools in which mobility networks are not conceived as a sectoral dimension but as a crucial bridge connecting *polis* to *civitas* and *urbs* (Figure 3).

Figure 3. Bologna, Piazza Santo Stefano. © Chiara Ravagnan, 2019

Figure 4. Bologna, Andratuttinbici campaign. © Dynamo La Velostazione, 2020

In recent years, Bologna has been at the forefront of the fight against environmental and health challenges, pointing out the systemic interactions that influence human well-being in urban contexts connecting the sustainability of mobility, the safety of social interactions, and the quality of public spaces and networks (EU, n.d.). This coincides with the recent spotlight on resilience as the key concept to rethink the multiple dimensions of regeneration in a holistic approach that combines spatial, environmental, social, economic, and institutional issues (Figures 4, 5).

Reflecting on the meaning of urban resilience through the Bologna case and, in particular, the city's mobility planning tools, this article elucidates the integrated approach of mobility strategies between public, green and movement spaces in the framework of climate changes, pandemic issues, and social challenges. The focus is on the Bologna mobility plans and projects, whilst finally drawing some lessons for new scenarios to be explored in the future.

Figure 5. Bologna, a cycling path within the city cycling network. © Chiara Ravagnan, 2019

Resilience: Interpretation Keys in the Emerging Urban Realm

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The contemporary settlement forms and mobility models brought about by metropolisation (Indovina, 2005) became the bearers of environmental pathologies and socio-economic imbalances (Crutzen, 2000), exacerbated in the new millennium by the economic crisis of 2008 and the pandemic of 2020 (Honey-Rosés et al., 2021). The high levels of soil-sealing and gas emissions contribute to air pollution, a progressive lack of biodiversity, water risks, global warming, fostering frequent calamitous events in the framework of climate changes (IPCC, 2014; EEA, 2021). Urban sprawl is also accompanied by physical fragmentation of public space, lack of public accessibility, increasing social isolation, and poor cohesion, all phenomena affecting especially vulnerable categories of citizens during lockdowns when local public spaces are the first resources of social life and human well-being (UN-Habitat, 2020; OECD, 2020).

Environmental and health issues have revealed the weakness of urban strategies based only on mass transit and car mobility as well as indoor activities, highlighting the need to pay attention to the flexibility, intermodality, and interoperability of infrastructures and public spaces. In particular, these issues have increasingly emphasised the need for an authentically holistic perspective to urban resilience (UNDRR, n.d.).

Resilience, a polysemic term, used in different disciplinary fields, has recently entered urban studies, becoming one of the essential principles of urban and territorial policies fostered by institutions such as the European Union (EU) and the United Nations (UN). Resilience is an answer to the complexity of urban interaction, guiding all these sectors towards a sustainable urban metabolism, the use of smart technologies, the implementation of eco-friendly and adaptive urban spaces and networks, as well as the improvement of institutional cooperation (Chelleri, 2012). Moreover, resilience is related to the concept of anti-fragility (Blecic & Cecchini, 2016) that fosters the capability for adaptation to external

perturbations, facing vulnerability, preventing risks, and offering multiple, coordinated actions that enable system improvements within rapid stresses and long-lasting changes (Taleb, 2012).

Resilience, thus, fosters proactive adaptation to environmental, economic, and socio-cultural changes and pays attention to the uncertainty of the scenario-making approach and the scarcity of resources, as well as the need for data analysis, flexibility, and reversibility. At the same time, it affirms the importance of pursuing strategies rooted in the *milieu* – the local context – and place-based approaches, focusing on the overall and multi-scale quality of the networks of physical, cultural, economic, and social relationships.

Facing recent global challenges (massive migrations, pandemics, wars, commodity crises, increasing inequalities), the most innovative contemporary cities foster original interpretation models in terms of resilience, gambling on the ideas of inclusionary communities, participatory democracy, advocacy planning, and civic imagination. The rethinking of the fascinating concept of the 'right to the city' (Lefebvre, 1968) involves the careful distinction between 'matters of fact' and 'matters of concern' (Latour, 2004), unveiling the hidden and neglected factors that can influence and shape the physical reality. They can be defined as 'gatherings' of ideas, forces, players and arenas in which 'things' and issues, not facts, come to be and to persist, because they are supported, cared for, worried over.

Within such a risky context, it is evident that urban resilience requires a holistic approach to urban equity, efficiency, safety, and security, strengthening the relationships between physical networks (infrastructures and transports as well as green corridors) and intangible systems (ICT for information, communication, and dissemination, and for regulated social interactions) considered strategic vectors for creating cognitive urban platforms towards the development of a new collective intelligence. Distinguished schools of thought and international research teams agree that resilient cities should demonstrate at least seven indisputable qualities: reflectiveness, resourcefulness, robustness, redundancy, flexibility, inclusiveness, and integration (Arup International Development, 2015). To this end, urban resilience requires institutional cooperation for a shared cultural project and for smart governance of spaces, services, and processes (Lauri, 2021), combining infrastructures and ecosystems, leadership and strategy, health and well-being, and economy and society (Figure 6).

Sustainable Urban Mobility Plans Chasing Resilient Strategies

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Urban resilience finds concreteness in the choices aimed at strengthening sustainable mobility, ecosystem services, and safe social interactions in the construction of urban networks, reconfiguring the methodological references for urban space planning, design, and management. The growing innovation of urban and metropolitan resilience strategies is increasingly played out on the enrichment of the territorial vision through the role of mobility networks. Looking at the 'space of movement', new planning strategies and tools can overcome traditional separations between mobility planning and land use design developing a particular attention to participatory democracy processes.

Many metropolitan cities are developing resilient strategies based on 'local mobility grids' (Cerasoli et al., 2021, Ravagnan et al., 2022) in order to improve public space quality, intermodality, and local accessibility to centralities and facility systems. This goal is supported by the theoretical concept of the '15-minute city' (Moreno, 2020) consolidated within years of studies and highlighted by the Paris

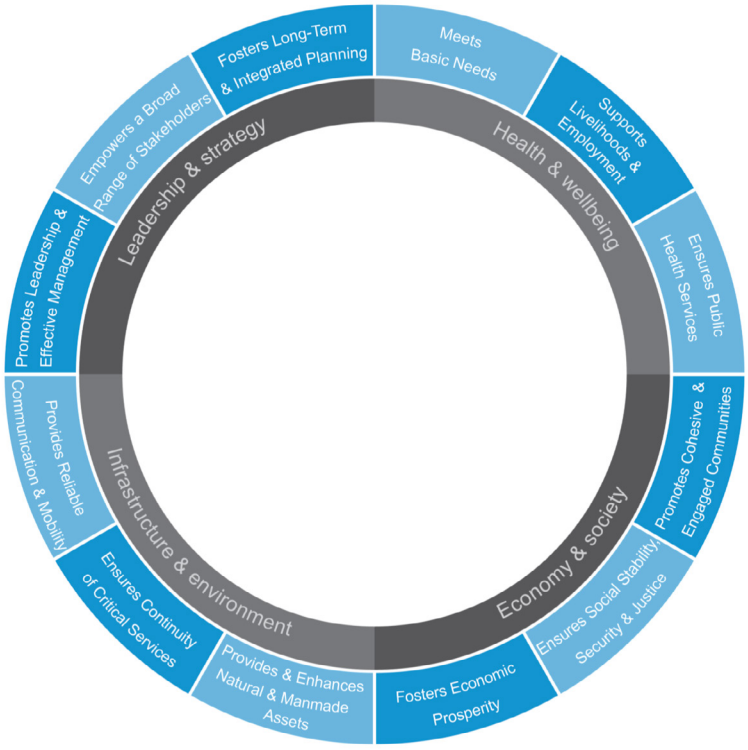

Figure 6. Resilience City Framework. Source: Arup International Development, 2015

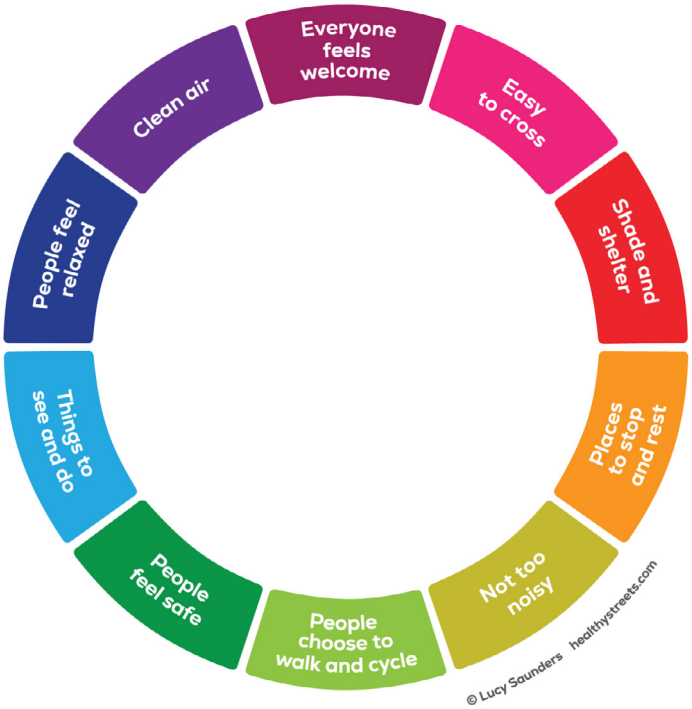

Figure 7. Healthy Street Indicators. Source: London Government, n.d.

Authority within the Covid-19 explosion. This concept promotes a reorganisation of local accessibility with compact fabrics and services, in order to enable an increase in the quality of life in normal times and risk reduction during environmental and health crises.

On the road toward sustainability and institutional cooperation, the EU Sustainable Urban Mobility Plan (SUMP) was officially introduced through the Mobility Urban Package (EC, 2013) and progressively implemented by the 27 EU Member States. It represents the ambition of combining mobility and transport infrastructures with the urban space design in order to implement the ecological transition through the coordination of different infrastructure networks and urban spaces, replacing a sectoral approach. Furthermore, SUMPs are often coordinated with previous sectoral bike plans, as in the most virtuous Italian interpretations.

Looking at European good practices, an intriguing proposal for an integrated approach combining urban fabric and mobility grid has been developed in the Good Move Mobility Plan for the Capital-Region of Brussels 2030 (awarded as the best SUMP in 2020), where the design strategy of the 'street space' (*espace rue*) proposes a hypothesis to reorganise relationships, interactions, and conflicts between public space use and mobility infrastructures at urban and local scale, highlighting the importance of a comprehensive approach to the public domain, in compliance with the indicators of the 'healthy street' method (Figure 7), defined at the international level (London Government, n.d.).

Recent experiences with the pandemic have informed the conception and implementation strategies based on flexible and reversible expansion of the space dedicated to pedestrians and soft and micro-mobility. For example, the 'superblocks' (*superillas*) of Barcelona (Rueda, 2017) and 'open squares' (*piazze aperte*) of Milan (Alberti & Radicchi, 2022), have outlined the framework of 'tactical urbanism' as a method for improving public space and implementing temporary bike lanes, or as experimentation for future structural projects of cycle systems in SUMP, in order to test the interest of citizens and the possible synergies and conflicts with other forms of mobility and public spaces.

Bologna: Metropolitan Identity Through Mobility Planning

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At the end of 2019, Bologna was the first metropolitan city to approve its Sustainable Mobility Plan, the 'Italian interpretation' of the EU strategic tool of SUMP designed to meet the mobility demand of residents, economic activities, and city-users for quality-of-life improvement. The plan promotes the innovation of traditional approaches between 'stasis space' and 'movement space' through the principles of resilience, integration, and participation.

As formalised at the EU level, the SUMP is the climax of an evolutionary path starting from a consultation conducted on behalf of the European Commission (EC) from 2010 to 2013 with the involvement of numerous experts and sector players. The work finally led to the Urban Mobility Package (EC, 2013), which recognised the SUMP as a new strategic tool for integrating mobility, accessibility, and the city realm throughout EU urban and metropolitan areas. Some countries, such as France and Italy, have mandated SUMPs for cities or polycentric areas with at least 100,000 inhabitants. This joint work has merged into the first and second edition of the SUMP Guidelines (Rupprecht Consult, 2013, 2019), official EC documents addressing public and private stakeholders and aimed at the collective conception, implementation, and management of the plan with the ambition of integrating mobility networks, transportation systems, and urban planning strategies.

In Bologna, the Metropolitan Mobility Plan philosophy hinges on the participatory involvement of citizens and other stakeholders, the coordination of administrations at different levels, the harmonisation of sectoral strategies to enhance synergy, and progressive tools. The plan aims at participatory democracy, processualism, prefiguration and evaluation of evolutionary scenarios, and careful monitoring and remodelling of implementation phases.

In the first national Sustainable Mobility Inter-municipal Plan, the vision aims to 'make Bologna metropolitan area more attractive through high levels of urban quality and liveability in order to enhance the cohesion and attractiveness of the territorial system as a whole and strengthen the role of its capital as international city' (Metropolitan City of Bologna, 2019: 21). The tool pursues the objectives of territorial development and regeneration by placing the crucial focus on values, rights and primary needs of the community, from health to safety, from accessibility to essential services and social inclusion, and from education to work and leisure.

The holistic approach evoked in the disciplinary debate finds a concrete expression in the macro-objectives that outline the pillars of urban and territorial sustainability. The mobility and accessibility issues stand out in their kaleidoscopic interpretations: from the physical-spatial dimension of the reconnection between centrality and peripheries, to the 'environmental imperative' of tackling emissions and fostering resilience to climate change (Figure 8).

The accessibility ensured by collective transport networks and by encouraging micro-mobility is then seized on as an opportunity to restore urbanity, social cohesion, proximity facilities, and a 'sense of belonging' to the communities widespread across the territory (Monardo, 2020). Bologna, even during the pandemic, bore out the assumption that administrations traditionally active in outlining integrated policies and open, inclusionary processes tend to be resilient and capable of embracing adaptive and flexible power-geometries when faced with emergencies and disasters.

In the Bologna innovative tool, the resilience approach is highlighted by the *biciplan*, a sort of environmentally friendly cycle metro (inspired by the *Réseau Vélo* of the Paris region), conceived ex-ante and then integrated into the new plan (Figure 9). A precious resource for its capacity to create an organic framework, the *bicipolitana*, a structural and interconnected bike network that proved to be very effective both for the tactical interventions solicited by the health emergency and for the long-term strategic relationship system.

Resilient Mobility for a 'New Urbanity'

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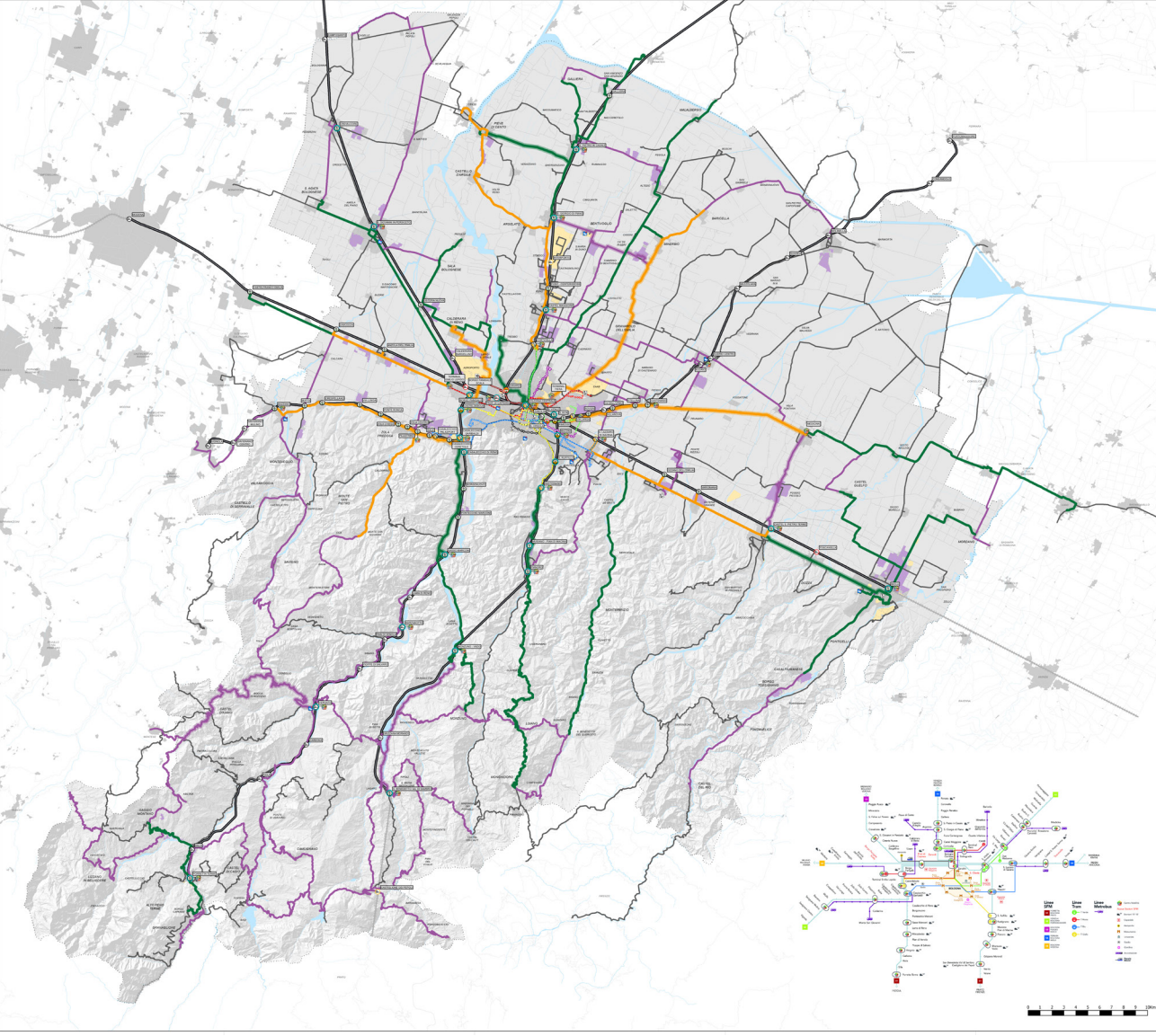
The Bologna experience shows how cities capable of promoting and implementing tools based on holistic and strategic approaches are able to reignite synergistically physical and intangible networks for urban and metropolitan resilience. Bologna's recent planning path shows the integration of mobility networks and public transportation systems with urban patterns, green-blue corridors, and public spaces to be planned through the steps of participatory democracy. The tools recently employed in the Bologna metropolitan area represent the essential matrix useful for rethinking and adapting the spaces and forms of mobility when confronted with unpredictable emergencies.

The original principles of new mobility plans transcend the sectoral dimension, assuming a strategic role through the ambition to integrate infrastructural space and land use design at a metropolitan scale. This is an attempt to prefigure a 'new urbanity' based on the synergy between the dimension of movement and



LEGENDA

Centri di mobilità
Terminal

RETE TRAMVIARIA - LINEE T

Rossa
Rossa (alternative di tracciato)
Verde
Verde (alternative di tracciato)
Gialla
Gialla (alternative di tracciato)
Blu
Blu (alternative di tracciato)

RETE BUS - LINEE B

Metrobus I Livello potenziato (15' nelle ore di punta)
Metrobus I Livello (30')
II Livello potenziato (30' nelle ore di punta)
II Livello (60')
III Livello potenziato (60' nelle ore di punta)
III Livello potenziato (120')
IV Livello
Filoviaria esistente
Filoviaria 25 (progetto Pimbo)

RETE SFM - LINEE S

Linee SFM

Fermate

SFM esitente
SFM progetto
SFM studio di fattibilità
SFM cadenzamento 15' (fascia di punta)
Interscambio SFM-Tram-Bus (I-II livello)
Interscambio SFM-Tram
Interscambio SFM-Bus (I-II livello)

People Mover

People Mover

Poli attrattori

Poli funzionali
Ambiti produttivi
Aeroporto
Ospedale
Università

Rete ferroviaria
Viabilità locale
Reticolo idrografico principale
Confini amministrativi

Figure 8. Metropolitan public transport, fully operational scenario. Source: Metropolitan City of Bologna, 2019

TOC

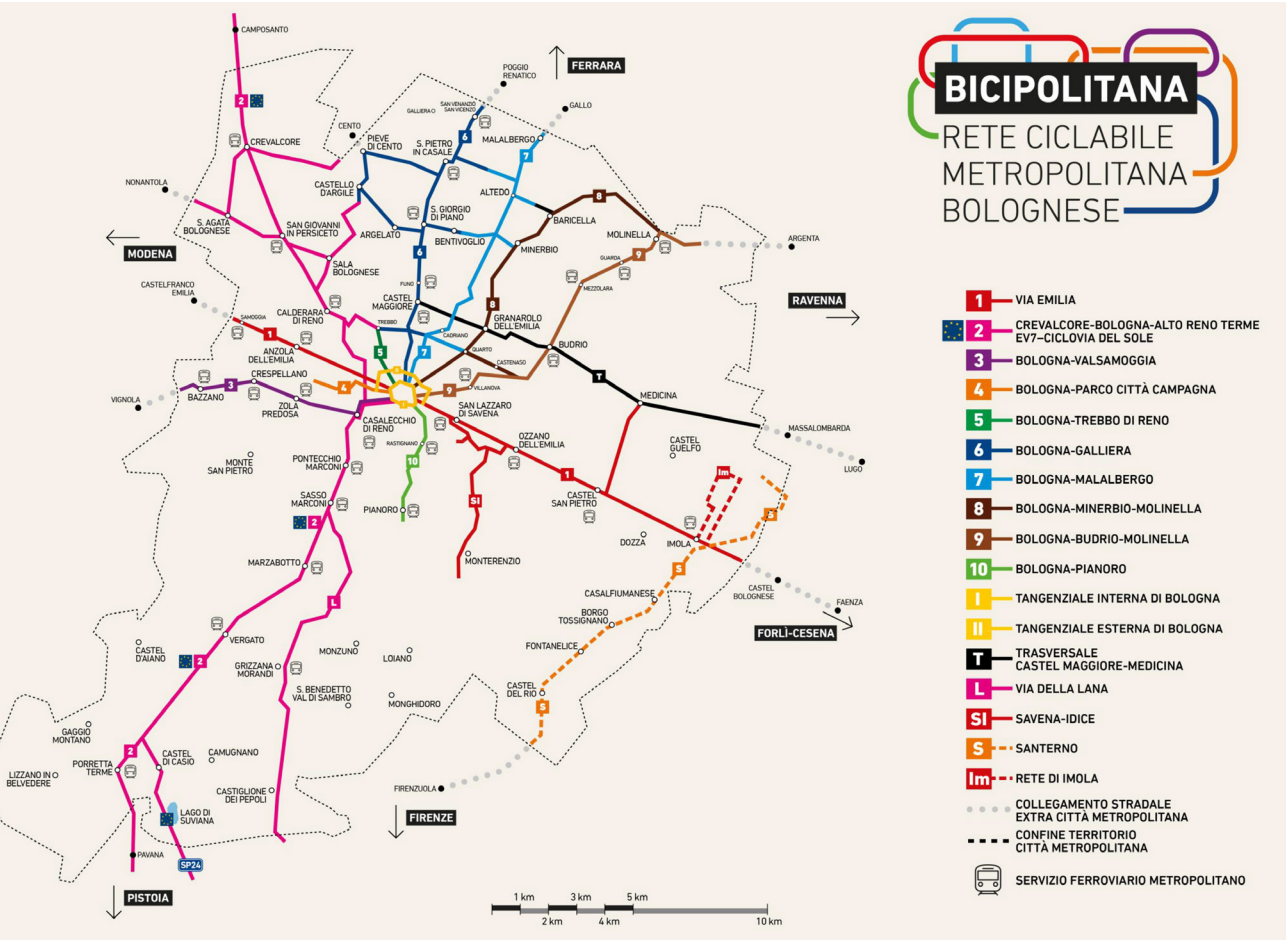


Figure 9. Bicipolitana Plan. Source: Metropolitan City of Bologna, 2019

the space of stasis that have been experimented during lockdowns (Monardo, 2020). Understood as the reciprocal adaptation of urban fabric morphology and conviviality form (Choay, 1994, 1996), 'new urbanity' represents the intertwining of the social mix, promoting integration and celebrating public space in all its forms, which then becomes the privileged place for further development. Hence, mobility spaces, with particular attention to pedestrian and cycle paths, offer original and creative interpretations of urbanity (Lévy, 1997).

In Bologna, the idea of 'urbanity through mobility' emphasises the crucial importance of flows and their spatial devices, connectors able to multiply opportunities and make it possible to meet 'otherness' (Figures 10, 11). The privileged dimension of urbanity is related to networks that 'build' the territory and to the assumption that the pedestrian realm, the public space metric, represents its structuring rationale (Lévy, 2004). The time of the pandemic confirmed the centrality of proximity space and the related 'active mobility', showing, paradoxically that the pedestrian metric can become the richest and fastest in terms of interaction, diversity, and serendipity. Mobility is not just an opportunity to create relationship spaces but embodies the essence of 'place' wherever it is produced. Hence, it is not just a technique to connect nodes and areas, but the vector of an everlasting new 'urbanogenesis'.

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Figure 10. Pedestrian area of the Manifattura delle Arti. © Chiara Ravagnan, 2019

Figure 11. Pedestrian area of the Manifattura delle Arti. © Chiara Ravagnan, 2019

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