

## Research Group

### Small open spaces as techNOlogical DEvices in the urban ecoSystem \_ NODES

#### Reference year:

2025

#### Scientific Coordinator:

FRETTOLOSO Caterina / Associate Professor / Dipartimento di Architettura e Disegno Industriale/  
Università degli studi della Campania "Luigi Vanvitelli"

#### Group members:

CALABRÒ Marco / Full Professor / Dipartimento di Architettura e Disegno Industriale/Università  
degli studi della Campania "Luigi Vanvitelli".

GUIDA Giuseppe / Associate Professor / Dipartimento di Architettura e Disegno Industriale/  
Università degli studi della Campania "Luigi Vanvitelli".

MATRICANO Diego / Associate Professor / Economia/ Università degli Studi della Campania

MUZZILLO Francesca / Full Professor / DiLBEC/ Università degli Studi della Campania

VIOLANO Antonella / Associate Professor / Dipartimento di Architettura e Disegno Industriale/  
Università degli studi della Campania "Luigi Vanvitelli".

BOCCHINO Chiara /Research fellow/ Dipartimento di Architettura e Disegno Industriale/  
Università degli studi della Campania "Luigi Vanvitelli".

CHAIB Farah Lyna /PhD Student / Dipartimento di Architettura e Disegno Industriale/ Università  
degli studi della Campania "Luigi Vanvitelli".

REDOUANE Zomorrouda /PhD Student / Dipartimento di Architettura e Disegno Industriale/  
Università degli studi della Campania "Luigi Vanvitelli".

ZERARI Salima /PhD Student / Dipartimento di Architettura e Disegno Industriale/ Università  
degli studi della Campania "Luigi Vanvitelli".

KEHNE Holger /PhD/Part-time lecturer/University of Plymouth (UK)

#### Description of research lines:

Based on the methodological tools of technological and environmental design, the research group investigates issues related to the strategic technological, environmental, social, and economic role open spaces play in the urban ecosystem, contributing to or not contributing to achieving sustainability goals.

In particular, the research group, with an integrated, inter-scalar and inter-disciplinary approach, investigates thematic areas that can be traced back to two lines of research:

- **Networking approach:** connectivity and capillarity for resilient urban environments.

This research line explores the potentialities of open space design as a dynamic and

inclusive system in a dense environment in an urban context. The need for a systemic approach to this issue is closely linked to the necessity to reconnect buildings, people, and the city with nature by working on the street system, building, and interstitial micro-spaces to ensure functional continuity and provide ecosystem services. Interesting national and international research-project experiences confirm the need to operate according to adaptive logics centred on punctual and widespread actions whose technological-environmental contribution manifests in individual solutions' capillarity.

Sharing this logic, the research group will deepen methodological, and design aspects intended at an operative code aiming at identifying meta-design layouts, based on the

“micro and interconnected” formula, to trace trajectories that are not always coplanar, often starting from the re-naturalisation of buildings and then arriving at the open space. This is to provide public administrations, residents and subjects involved in transformation interventions, with "dynamic" prefiguration tools of the possible choices that can be implemented to increase the knowledge and awareness of the good practices and the related advantages in technological, environmental, and socio-economic terms.

#### - Urban open spaces as technological devices.

Sharing the importance of working on integrated and complex approaches capable of holding together spatial, environmental, and socio-economic dimensions, and centred on multi-scale, the research group explores the performance features linked to the key role that open spaces can assume within the urban network in managing technological and environmental issues. Shared and accessible spatial habitats, the urban open spaces can be interpreted as hybrid interfaces in which new balances between natural and artificial systems experiment to create living arrangements that are self-sufficient and can reduce emissions and climate vulnerabilities and thrive about the changing challenges to be faced.

The concept of HUB, as a driving element and in the broader sense, as a "connective" node, well interprets the role that some urban open spaces could have within complex and dense cities: a “multifunctional urban device” that, incorporating eco-logical and technological elements, provides ecosystem and energy services according to different levels of natural-ness and artificiality. As shown also by recent international experiences, strongly focused on densifying the full by enhancing the void, there is a need to increase the technological- environmental dimension of urban open spaces and, in general, of the connective tissue, so that density constitutes an opportunity to create urban environments on a human scale and proximity ones.

#### **Relationships with other research groups of the University of Campania L. Vanvitelli during the last three years:**

Carbon Neutral Built Environment – Scientific Resp. A. Violano  
BIM technology and material innovation: from efficiency to environmental compatibility – Scientific Resp. R. Franchino

#### **Participation in research projects during the last three years:**

**Project title: Prospective Networks: criteria for responsive micro-environmental urban system (Pro\_Nets)**

Scientific coordinator: Caterina Frettoloso

**Call title:** Call for proposal for the funding of fundamental and applied research projects dedicated to researchers not recipients of other funding

**Abstract:** Urban regeneration projects aimed at reconnecting buildings, people, and the city with nature have shown that increasing biodiversity and continuity of use can be achieved by improving the street system, roofs, building façades, and interstitial micro-spaces.

Urban small-scale can be rich in biodiversity, contribute ecological benefits for human health and help create more livable cities by increasing the green component or de-paving, introducing functional elements for collective activities, considering the overall technological-environmental balance on the one hand and the innovation and naturalness of the proposed intervention on the other. Sharing this logic, the main aim is to experiment, through a "micro and interconnected"

formula, a methodology based on the definition of meta-design criteria for the preliminary selection of urban system components (micro-spaces and links) in a highly dense city both for ensuring

functional continuity and to provide ecosystem services.

**Involved persons:** Marco **Calabrò**, Claudia de Biase, Marco Francesco Errico, Rossella Franchino, Diego **Matricano**, Francesca **Muzzillo**, Nicola Pisacane, Antonella **Violano**, Salima **Zerari**

**Partners:** Università degli Studi della Campania "Luigi Vanvitelli"

**Submission Date:** 18 Marzo 2024

**Project Status:** positively evaluated but NOT FUNDED

**Project title:** **Reloading city: a new systemic approach to urban and territorial regeneration**

**Scientific Local Responsible:** Marco **Calabrò**

**Call title:** Prin 2022

**Description of research activities:** The research activities will focus on urban regeneration, as a development strategy for the country and as a tool for recovery from the post-pandemic crisis. At the center are the economic and social objectives that distinguish regeneration from reuse and urban redevelopment and the potential which, despite its centrality in the recent urban debate, still remains largely unexpressed. The research leverages on three aspects: 1. restoring the centrality of the public actor in the governance of regeneration processes, as a subject capable of conveying planning and directing private initiatives; 2. rethinking regeneration starting from the public city; 3. recover the systemic character of the urban planning project, overcoming the dichotomies between centers and peripheries, with their sectoral and ineffective technical, juridical and regulatory tools.

**Involved Staff:** Adriana Galderisi; Francesco Costanzo; Mario Sorrentino

**Partners:** Università degli Studi di Perugia; Università degli Studi di Sassari; Università degli Studi dell'Aquila; Politecnico di Bari.

**Submission Date:** 30/03/2022

**Project Status:** FUNDED (in progress)

**Project title:** **Campania Architecture 2023\_plural territories**

**Scientific Local Responsibles:** Ornella Zerlenga, Francesca Castanò, Giuseppe Guida

**Call title:** Architecture Festival II edition, 2022-2023, financing of projects aimed at supporting contemporary Italian architecture and disseminating its knowledge nationally and internationally - Ministry of Culture

**Description of research activities:** The project related to the "Campania Architettura 2023\_plural territories" Festival, by underlining the plurality and diversity of the regional territory, will firstly start from the knowledge of places and heritage of modern and contemporary architecture, also through the comparison among the different urban and territorial realities. In imagining the future development of the territories, a role is recognized for architecture which, through processes of

active participation of local communities, can return to be a key tool for regeneration and redevelopment of places, trying to answer the questions that cities and territories pose with respect to their future.

*Involved Staff:* Giuseppe Guida, Francesca Castanò, Ornella Zerlenga, Chiara Ingrosso, Adriana Galderisi, Gianluca Cioffi.

*Partners:* Regione Campania, DIARC, Fondazione Annali dell'Architettura, ENSA Paris-Malaquais

*Submission Date:* 13/10/2022.

*Project Status:* **FUNDED (reported December 2024)**

*Project title:* **Made in the South. Plans and architecture in “Terra di Lavoro”**

*Scientific Responsible:* Giuseppe **Guida**

*Call title:* Public notice of the Campania Region for the granting of contributions aimed at promoting the quality of architecture.

*Description of research activities:* The research focuses on the Industrial Development Areas (ASI), with particular reference to that of the province of Caserta, interpreting them as the result of an overall planning approach. In fact, the Master Plan of the ASI of Caserta is an example of the most advanced urban culture of the 60s of the last century, and it was an occasion for the creation of numerous works of modern architecture. In this sense, the research aims to reconstruct their genealogy by considering the individual architectures not as monads, albeit of their quality, but as interconnected architectural and urban facts, the result of a fruitful relationship between the urban plan and the architectural project, and as identity and cultural elements of the entire territory of Terra di Lavoro. The research project, in line with the general objectives of the call, intends to draw attention to the dynamics of territorial transformation connected to industrial planning.

*Involved Staff:* Giuseppe Guida, Francesca Castanò

*Partners:* Campania Region

*Submission Date:* October 2022

*Project Status:* **FUNDED (ended April 2023)**

*Project title:* **Renewable Energy Communities as an INNOvative model of Social and Energy Transition – (ECO-INNO-SET)**

*Scientific Responsible:* Marco **Calabrò**

*Call title:* Prin PNRR 2022

*Description of research activities:* The project aims to verify the adequacy of actions undertaken and planned with a view to promoting the use of "green energy" through shared energy models, in order to examine: 1) how much the current regulation and legal instruments allow an adequate development of Renewable Energy Communities, enabling them to contribute to the security of energy supply, the reduction of energy losses, the sustainability of the energy market and, in generally, to the fight against energy poverty ; 2) what further legal instruments – also in the light of existing good practices – could be adopted to make public policies in this sector more effective and consistent with medium and long-term objectives. The ultimate goal is to offer a set of theoretical- practical and regulatory tools, useful to local authorities, citizens and economic operators, to facilitate the implementation of effective models for the establishment and management of EWCs.

*Involved Staff:* Anton Giulio Pietrosanti; Fortunato Gambardella

*Partners:* Università degli Studi di Napoli Federico II; Università degli Studi di Messina; Università degli Studi di Foggia.

*Submission Date:* 28/11/2022

*Project Status:* NOT FUNDED

*Project title:* **RE.VI.VE 4.0 - Intersystem models and digital trans-scale meta-design platforms to improve the attractiveness of villages 4.0**

*Scientific Local Responsible:* Rossella Franchino

*Call title:* PRIN 2022

*Description of research activities:* Research activities are oriented towards the use of digital platforms to support the meta-design phase with a trans-scalar approach in order to outline a methodology that can guide the transformation/regeneration processes of small villages in a circular logic.

*Involved Staff:* Alessandra Avella, Rossella Franchino, Caterina **Frettoloso**, Nicola Pisacane, Francesca **Muzzillo**

*Partners:* Università degli Studi della Campania “Luigi Vanvitelli”, Università degli Studi “G. d’Annunzio” CHIETI-PESCARA

*Submission Date:* March 2022

*Project Status:* NOT FUNDED

### **Scientific products during the last three years:**

*10 scientific publications in Class A journals and/or indexed in the Scopus/WoS databases:*

- [1] Frettoloso, C., Hinderdael, L., Muzzillo, F. (2024), Reclaiming nature in the city, in ABITARE LA TERRA, vol. Quaderni 10 Supplemento alla Rivista di geoarchitettura, p. 18-20 (Rivista di Classe A)
- [2] Franchino, R., Frettoloso, C., Gallo, P. (2024), Regeneration of Urban Open Spaces as a Tool for Integrating Nature and Built Environment, in A.A.V.V. (a cura di) C. Gambardella, For Nature/With Nature: New Sustainable Design Scenarios, Springer Series in Design and Innovation, vol. 38, p. 591- 612, Springer, doi: 10.1007/978-3-031-53122-4\_36 (Scopus)
- [3] Calabrò, M., De Biase, C. (2024), Il governo del territorio nel confronto tra saperi: note su una prospettiva funzionale della pianificazione del verde urbano, in Rivista Quadrimestrale di Diritto dell’Ambiente, 1-2024, p. 185-212 (Rivista di Classe A)
- [4] Violano, A., Muzzillo, F., Hui, D. (2024), Accordi di Partenariato UE vs Hong Kong: andamenti di senso inverso/ Europe vs Hong Kong partnership agreements: reversing trends, in TECHNE - Journal of Technology for Architecture and Environment, p. 60-73, doi: 10.36253/techne-15913 (Rivista di Classe A)
- [5] De Biase C., Guida G., Bocchino C., Napolitano A. (2024), In search of a new urban livability. The case study of Parco Verde neighbourhood, in ABITARE LA TERRA, supplemento al n. 60, pp. 21-23 (Rivista di Classe A)
- [6] Zerari, S., Franchino, R., Pisacane, N., Llatas, C., Soust-Verdaguer, B. (2024), Addressing the Difficulties and Opportunities to Bridge the Integration Gaps of Bio-Based Insulation Materials in the European Construction Sector: A Systematic Literature Review, in Sustainability, doi: 10.3390/su16198711 (Rivista di Classe A)
- [7] Franchino, R., Frettoloso, C. (2024), Re-thinking Urban Open Space as a Tool for “Normality”, in A.A.V.V. (a cura di) E. Manahasa F. Naselli A. Yunitsyna, COVID-19 (Forced) Innovations Pandemic Impacts on Architecture and Urbanism, The Urban Book Series, p. 39-47, Springer, doi: 10.1007/978- 3-031-56607-3\_4 (Scopus)
- [8] Violano, A., Cannaviello, M., Franchino, R., Frettoloso, C., Muzzillo, F. (2024), From Self-Reliant to Sufficiency Design: Predictive and Forecasting Features of Technology Approach. In: (a cura di): Calabrò F. Madureira L. Morabito F.C. Piñeira Mantiñán M.J., Networks, Markets & People. LECTURE NOTES IN NETWORKS AND SYSTEMS, vol. 1189, p. 115-126, Cham: Springer Nature, doi: 10.1007/978-3-031-74723-6\_10 (Scopus)
- [9] De Martino, R., Franchino, R., Frettoloso, C. (2023), A “Stepping Stone” Approach to Exploiting



Urban Density, in E. Arbizzani, E. Cangelli, C. Clemente, F. Cumo, F. Giofrè, A. M. Giovenale, M. Palme, S. Paris (eds.), *Technological Imagination in the Green and Digital Transition*, The Urban Book Series, p. 639-648, Gewerbestrasse: Springer, doi: 10.1007/978-3-031-29515-7\_57 (Scopus)

[10] Matricano, D. (2022), The influence of the technological regime on the performance of Italian innovative start-ups, in *Technology Analysis & Strategic Management*, 36(5), 902–915.

<https://doi.org/10.1080/09537325.2022.2065978> (Rivista di Classe A)

*Additional 10 scientific products:*

[1] Franchino, R., Frettoloso, C., Pisacane, N. (2024), *Open space design: managing urban complexity*, Politecnica, Santarcangelo di Romagna (RN): Maggioli Editore, ISBN: 978-88-916-1641-8, doi: 10.30448/UNI.916.16418

[2] Frettoloso, C., Kehne, H., Muzzillo, F. (2024), *Small and Interconnected. Keywords to address future urban open spaces challenges*, Politecnica, Santarcangelo di Romagna (RN): Maggioli Editore, ISBN: 978-88-916-7432-6, ISSN: 2240-4392, doi: 10.30448/UNI.916.74326

[3] Fumo, M., Violano, A. (a cura di) (2023), *IM-MUTAZIONI. L'altro volto della piazza*. Di AA.VV.. vol. 3, Napoli: Luciano Editore, ISBN: 978-88-6026-339-1

[4] Bocchino, C., De Rosa, D. (2023) *French urban practices towards a circular urban metabolism*, In Karandinou, A. (ed.) *Repurposing Places for Social and Environmental Resilience*, Counterarchitecture, University of East London, ARUP, London, ISBN: 9781739268107

[5] Muzzillo, F., Pisacane, N. (2022), *New mobility models and new workspaces*, in *Abitare la terra*, Quaderni 7-8 (Rivista di Classe A)

[6] Franchino, R., Frettoloso, C. (2022), *Eco-innovative approaches as activators of the environmental reconstruction of compromised contexts*, in *TECHNE - Journal of Technology for Architecture and Environment*, (23), p. 134–145, doi: 10.36253/techne-12109 (Rivista di Classe A)

[7] De Martino, R., Frettoloso, C., Muzzillo, F. (2023), *Focus on connectedness: social, technological and environmental issues*, in E. Zervas (ed.), *4th International Conference on Environmental Design (ICED2023)*, vol. E3S Web Conf., 436 (2023) 07003, EDP Sciences, Atene, Grecia, doi: 10.1051/e3sconf/20234360700 (Scopus)

[8] R. Franchino, C. Frettoloso (2022), *Integrated green strategies to make cities more liveable*, in *Abitare La Terra*, p. 64-67 (Rivista di Classe A)

[9] Gastaldi, F., Guida, G. (2022), *Made in Sud. L'industria tra intervento pubblico e territorio dilapidato*, in *Crios*, n. 23, pp 42-55, DOI: 10.3280/CRIOS2022-023005 (Rivista di Classe A)

[10] Franchino, R., Frettoloso, C., Pisacane, N. (2022), *Built environment transformations: BIM and circular approach*, in *Sustainable Mediterranean Construction*, Volume 2022, Issue 16, p. 156-163 (Rivista di Classe A)

**Relationships with international and national Companies, Institutions, Research Centers, Universities during the last three years:**

**Agreement** between the Municipality of Piedimonte Matese and the Department of Architecture and Industrial Design for the Technical-Scientific Support to the drafting of the Municipal Urban Plan. December 2024, duration 12 months. Scientific Responsible: Prof. Giuseppe **Guida**

**Collaborations with Consortia, Scarl or other Institutions participated by the University of Campania Luigi Vanvitelli during the last three years:**

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**ISI Web of Science Subject Categories:**

Architecture

Environmental Studies  
Urban Studies  
Law  
Economics

**Scientific-Disciplinary Sectors:**

CEAR-08/C  
CEAR-12/B  
GIUR-06/A  
ECON-07/A

**Keywords:**

Sustainable transformative actions  
Urban micro-scale  
Connectivity  
Dynamic infrastructure  
Decarbonised built environment  
Public city  
Spillover effect

**ERC Categories:**

PE8\_3 Civil engineering, architecture, offshore construction, lightweight construction, geotechnics2.  
PE8\_3  
PE8\_11 Environmental engineering, e.g. sustainable design, waste and water treatment, recycling, regeneration or recovery of compounds, carbon capture & storage  
SH7\_5 Sustainability sciences, environment and resources  
SH7\_6 Environmental and climate change, societal impact and policy