



eMOTIONAL  
Cities



# NEWSLETTER # 8

MARCH 2025

## FOSTERING HEALTHIER CITIES



Cities are dynamic spaces where dreams and ambitions can flourish, but they can also be places of loneliness, stress, and disconnection.

Urbanization has a profound impact on human health, especially mental wellbeing. In response to these complexities, there is an urgent need for innovative urban planning, design, and architecture that prioritize public spaces and buildings as places of inclusion, health, and sustainability.

The fields of Neurourbanism and Neuroarchitecture have emerged as new approaches, exploring how the built environment influences our bodies, as well as our cognitive and emotional brain states.

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# MAIN MILESTONES

This newsletter highlights the key milestones of the eMOTIONAL Cities project and points out take-home messages for creating healthier and sustainable cities and communities, better equipped to face the challenges of global urbanization, loss of biodiversity, and climate change.

## Development of a Conceptual Framework

The project established a comprehensive framework linking urban environments, neuroscience, and health outcomes. This framework guides future research projects and interventions, and contributes to a comprehensive knowledge, key for creating policies aimed to improve physical and psychological health-related behavior.

## Development of a Toolbox for Spatial analysis of Urban health

The toolbox is UpToDate suite of tools, metrics, methods and indicators for spatial analysis relevant to urban health. It is an useful resource for researchers and professionals in the emerging field of neurourbanism.

## Development of a neurourbanistic novel methodology

The Integration of Neuroscience experiments in a controlled environment (Laboratory) and non-controlled environment (Public space), allows combining the contextual data with individual biofeedback. The project captures physiological and neurobiological responses of individuals interacting with specific urban features. This systemic approach provides insights into how different urban elements affect human emotions and cognition.

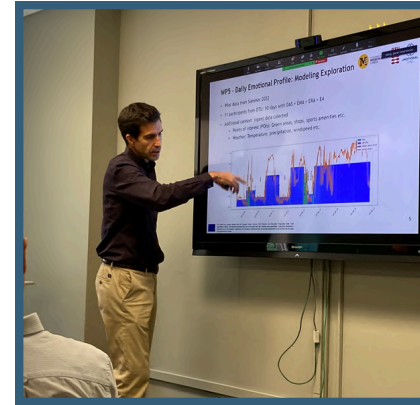
## Development of a prototype wearable kit

A backpack equipped with a set of wearable and mobile sensors, and with a GPS, is an unique prototype built for this project that is able to collect climate (air temperature, relative humidity, wind velocity, solar radiation, noise, radiant temperature, and compute UTCI), environmental (PM<sub>2,5</sub>; PM<sub>5</sub>; PM<sub>10</sub>), physiological (biosignals acquisition) and neural data (EEG), and the hardware integration system that allows to create a data synchronization in time and space.

## Scenario discovery for policy insights

This milestone focuses on translating scientific research into actionable insights through real-world case studies and scenario analysis. The scenario discovery process helps visualize possible urban futures, making the research findings directly applicable to decision-making in urban planning and governance. Moreover, recommendations will be supported by metrics and thresholds, leveraging policy action efficiency and tailoring it to the community.





## Understanding Urban Wellbeing through Brain Research



The built environment plays a significant role in the quality of life, independence, and safety of people with mild cognitive disorders or dementia. By prioritizing user-centric design and addressing the unique needs of individuals with cognitive impairments, the built environment can enhance their well-being, independence, and ability to participate actively in society. Urban planners and architects increasingly rely on insights from neuroscience to create environments conducive to emotional well-being. This includes prioritizing walkability, ensuring equitable access to green spaces, using materials that evoke warmth and safety, and designing spaces that foster social connections. By understanding how the brain and emotions respond to the built environment, we can better align urban development practices with human neurological and emotional needs.

## Strategies for Accessible and Reusable Data

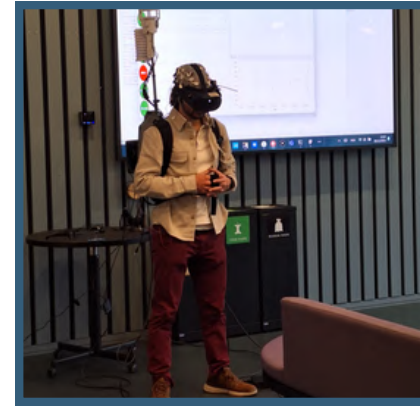
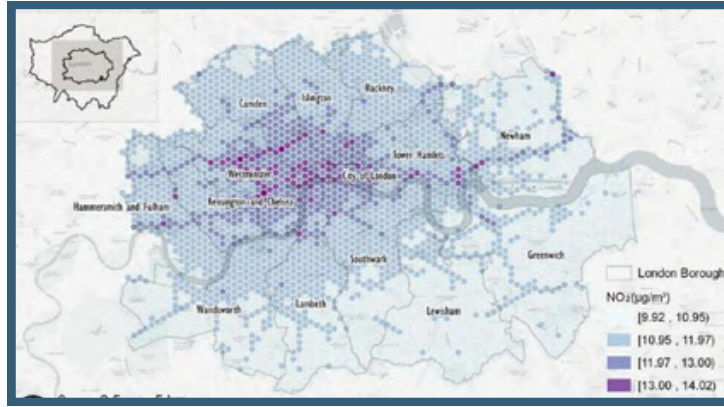


FAIR (Findable, Accessible, Interoperable, Reusable) data principles provide a robust framework for enhancing data management, sharing, and use across organisations and different fields. By ensuring that data is discoverable, usable, and reliable for a wide array of applications, these principles help maximize data's value. Drawing on the experience of the eMOTIONAL Cities project, this policy brief highlights the significance of implementing FAIR data principles and offers actionable recommendations for policymakers.

## Policy showcase on sustainable urban health



Scenario Discovery is a powerful tool for policymakers, enabling data-driven insights into urban stress factors and informing targeted interventions. Our research highlights that building density and social dynamics alone do not effectively reduce stress, emphasising the need for multifaceted strategies. Vegetation plays a crucial role in stress reduction, but its impact varies by location, requiring customised greening policies. AI-based sampling enhances Scenario Discovery by reducing computational costs while maintaining analytical accuracy. To create healthier urban environments, policymakers must integrate adaptive, evidence-based approaches that consider local environmental and social factors, ensuring resilient and well-being-focused city planning.



## Leveraging Spatial Analysis for Improved Urban Health and Wellbeing



This policy brief highlights the importance of spatial data and analysis in improving urban health outcomes. By integrating health, environmental, and socio-economic data, the spatial analysis toolbox identifies key health patterns and supports targeted urban planning. Using methods like heat maps and spatial autocorrelation, it enables precise interventions in high-risk areas. Policy recommendations include enhancing data-driven decision-making, supporting localised data to pinpoint high-risk areas, and strengthening policies to address health inequities based on age and gender.

## Understanding Urban Wellbeing through Brain Research



- Urban environments significantly influence emotional well-being, cognitive function, and stress levels.
- Neuroscience methods, like EEG and physiological monitoring, provide objective insights into how indoor and outdoor spaces affect human emotions.
- Findings suggest that well-designed urban spaces can promote well-being, reduce stress, and enhance cognitive function.
- Policymakers can integrate neuroscientific insights into urban planning to design healthier, more emotionally supportive environments.

## Results of neuroscience experiments



Urban environments profoundly influence human cognition, emotions, and behaviour, shaping health and well-being. The eMOTIONAL Cities project provides scientifically grounded insights into these complex human-environment interactions. Key findings from our neuroscience experiments highlight the importance of green spaces, adequate population density, reduction of air and noise pollution, and stress-reducing mobility solutions in mitigating urban stressors. Furthermore, the aging population calls for urban spaces that are intentionally designed to support individuals with cognitive impairments, ensuring safety, accessibility, and intuitive navigation to foster independence and overall wellbeing.



# ■ LATEST EVENTS



The final meeting of the eMOTIONAL Cities project, hosted by the Technical University of Denmark (DTU), took place on 9 and 10 December 2024

## WORKSHOP ON URBAN SPACES AND MENTAL WELLBEING

The first day featured an engaging **public workshop** focused on **Urban Spaces and Mental Wellbeing**. This session brought together a diverse group of leading experts in the fields of mental health, urban planning, and artificial intelligence, fostering a stimulating environment for the exchange of insights and innovative ideas, such as the **eMOTIONAL Cities Walker**.







## PRIVATE CONSORTIUM MEETING

The second day was dedicated to a private consortium meeting, during which the group engaged in meaningful discussions about the latest findings and developments of the project, promoting collaboration and strategic planning for future initiatives.





## II NEUROURBANISM WORKSHOP

The eMOTIONAL Cities Team, namely partners from IGOT-ULisboa and FMUL, organised the **2nd Neurourbanism Workshop**, that took place on January 16th at TTC@ULisboa – Technology Transfer and Knowledge Enhancement Centre of the Universidade de Lisboa.

The session started by presenting and discussing the results of neuro-urbanistic experiments conducted in public spaces across the streets of Lisbon, analysing the psychophysiological reactions of participants to different urban stimuli.

At the end, the participants formed groups and explored opportunities for improvement and suggested future directions for the project.



# ■ LATEST EVENTS

## 1ST INTERNATIONAL SYMPOSIUM NEUROURBANISM AND NEUROARCHITECTURE

The **1st International Symposium on NeuroUrbanism and NeuroArchitecture** took place on February 25 and 26 at MAAT, in Lisbon.

This event brought together experts from various fields, including architecture, urban planning and design, neuroscience, technology, and data science.

The goal of the event was to encourage debate, share diverse perspectives, and develop evidence-based knowledge to create healthier, more sustainable, and resilient cities.





## ■ LATEST EVENTS

The symposium program included presentations of the results from the European eMOTIONAL Cities project, along with two roundtable discussions. These discussions focused on the role of neuroscience in city planning and monitoring, as well as the future of architectural design.

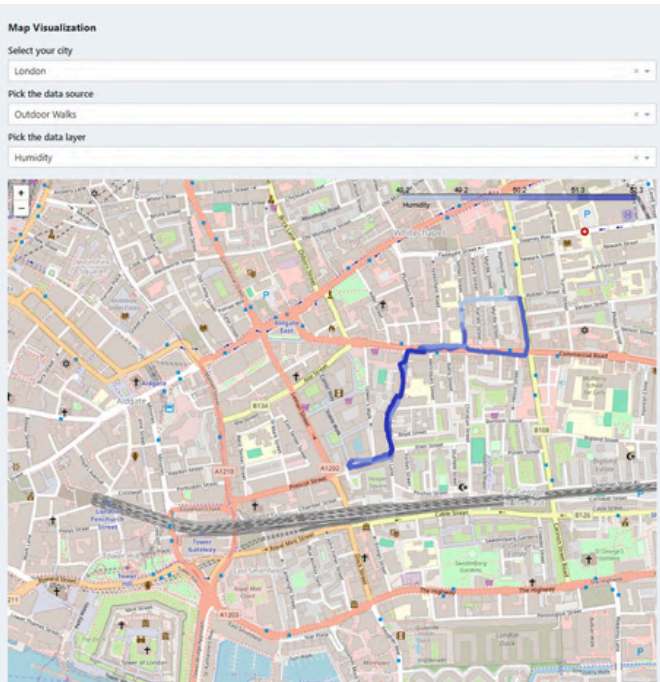
Additionally, the event showcased demonstrations of cutting-edge technology, including portable EEG devices, eye tracking systems, multisensory wristbands, virtual and augmented reality, and portable climate sensors.

These technologies were used for collecting psychophysiological and environmental data in urban settings used within the scope of the eMOTIONAL Cities project.





## EMOTIONAL CITIES DASHBOARD



## EMOTIONAL CITIES METADATA CATALOG

### eMOTIONAL Cities Metadata catalog

Items in this collection.

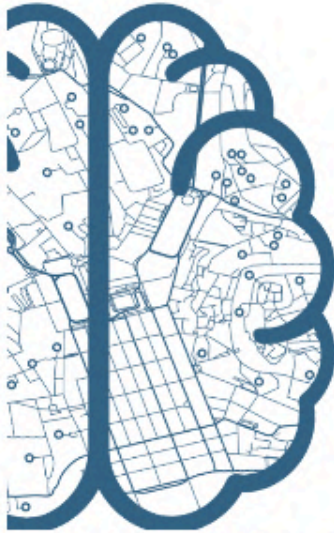


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<a href="#">hex350_gr...</a>	2025-02-26T08:55:35Z	2025-02-26T08:55:35Z	dataset	Prevalence rates of obesity in London	The mapping results of urban...	['urb- health 'health
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<a href="#">hex350_gr...</a>	2025-02-26T08:55:35Z	2025-02-26T08:55:35Z	dataset	Prevalence rates of mental...	The mapping results of urban...	['urb- health 'health
<a href="#">hex350_gr...</a>	2025-02-26T08:55:35Z	2025-02-26T08:55:35Z	dataset	Prevalence rates of dementia in London	The mapping results of urban...	['urb- health 'health



EMOTIONAL CITIES TOOLBOX



Spatial Analysis Toolbox



Toolbox for Spatial Analysis on Urban Health

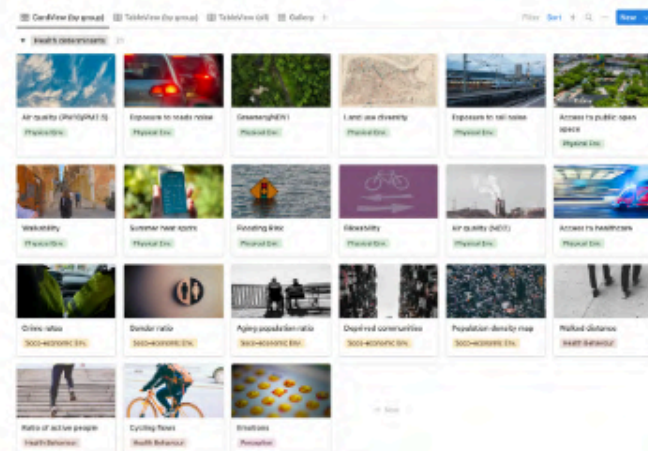
Created by @Dr. Haifeng Niu Contributed by: Prof. Elisabete A. Silva, Ana Seraphim and Adhib Hussain Syed.

We thank University of Lisbon the Professors: Dr. Paulo Morgado and Dr. Bruno Miranda, the PIs of eMOTIONAL Cities, and the project team for their valuable feedback and support.

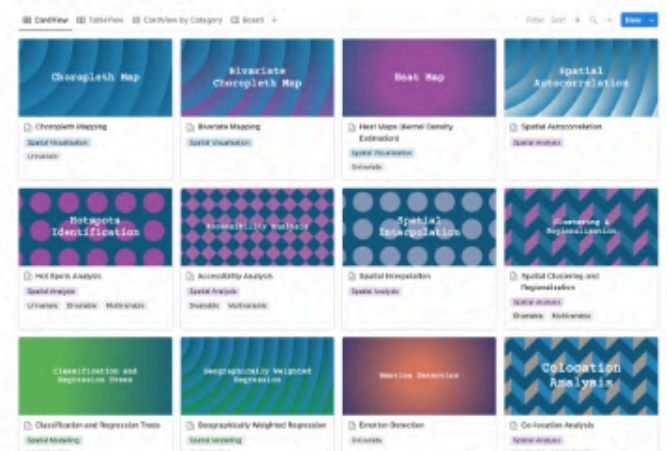
This toolbox provides reference cards for spatial analysis of urban health. The reference cards included here are two main types:

- reference cards of variables, index and metrics related to urban health determinants and outcomes;
- reference cards of spatial analysis and modelling of urban health.

Toolbox I: Indicator, Index and Metrics of Urban Health Variables



Toolbox II: Spatial Analysis and Modelling Methods for Urban Health



# TAKE-HOME MESSAGES



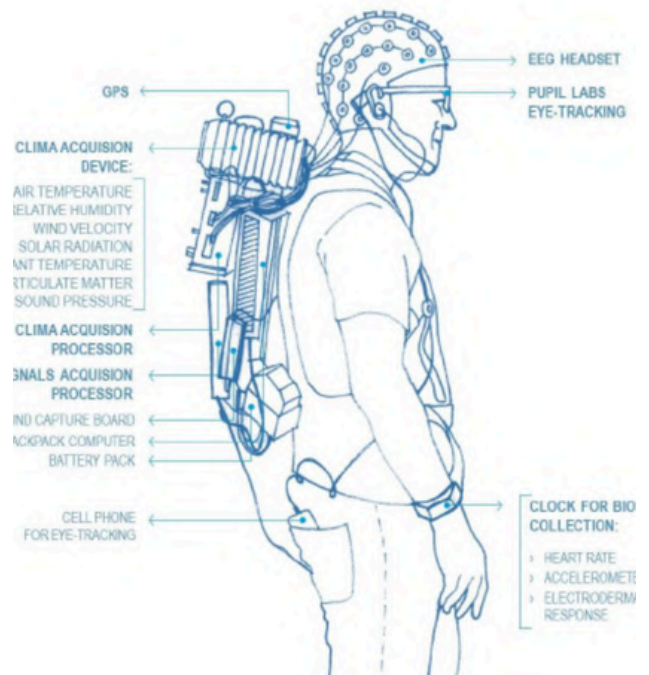
## URBAN DESIGN IMPACT ON HEALTH

The project's findings underscore the significant influence of urban environments on mental and physical health, highlighting the need for thoughtful urban planning and integration of health data in planning and design processes, in order to create spaces that promote cognitive performance, mental health and wellbeing.



## INTERDISCIPLINARY COLLABORATION IS ESSENTIAL

Addressing complex urban health issues requires a multidisciplinary approach, combining urban planning, neuroscience, and data science to develop holistic solutions. A systemic approach, human-centred, data monitoring, and the use of advanced urban analytics and tools, are critical form urban development in a context marked by climate change, global urbanization, and biodiversity loss.



## INCLUSIVITY IN URBAN SPACES

Designing urban areas that consider the diverse needs of all citizens, including vulnerable populations, is crucial for fostering inclusive and healthy communities.





# EMOTIONAL CITIES TEAM



*This project has been an inspiring journey, exploring the intersection of emotions, urban spaces, and innovation, with the collaboration of partners and creative minds from around the world.*

*We would like to express our gratitude to all our partners, researchers, and community members who contributed to the development and growth of this initiative.*

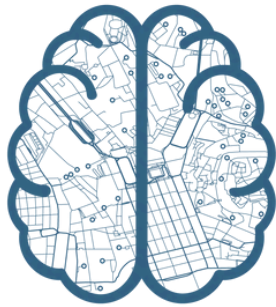
*Thanks to your collaboration, we have developed new approaches, fostered meaningful dialogues, and driven innovative solutions that, in the future, can reshape the way we experience urban spaces.*

*As we move forward, we reaffirm our commitment to creating more inclusive and sustainable urban environments.*

**We are excited about the challenges and opportunities ahead.  
Thank you all for being part of this journey!**



**Paulo Morgado & Bruno Miranda**  
eMOTIONAL Cities Coordinators



# eMOTIONAL Cities

Mapping the cities through the senses  
of those who make them



Instituto de Geografia  
e Ordenamento do Território  
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