What Got Us Here, Won't Get Us There

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Framing the Scope for Transdisciplinary Research in Architecture and Urban Design: A Work-in-Progress on the Future of Streets

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Abstract: Architecture and Urban Design, when working at a street level, demand a new transdisciplinary approach that not only involves other disciplines but also addresses design in a different way. The ubiquitous presence of information technologies together with critical changes in society (increased awareness on sustainability, diversity, and climate change) in the era of the end of the car demand completely new perspectives for human-scale city interaction. This article presents an ongoing Ph.D. research focused on setting a methodology and framework for a transdisciplinary approach to urban design at a street level. The study is based on a public-funded research project on the future of streets and the evolution of urban furniture piloted in a specific site in the city of Bilbao. In this article, we present the preliminary findings of both the methodological process and the early design of street systems/elements.

Keywords: Transdisciplinary design, Urban design, Street scale, Information technologies, Sustainability, Urban furniture design

1. Introduction

While urbanism and architecture have their own well-defined fields of practice and research, the study of the city at a human scale remains at an undefined intersection for both the dimensional scale of design and the methodological application of a scientific approach, straddling humanistic and technical practices. In this study, currently in its early stages, we aim to contribute to the definition of an "ad hoc" research and practice methodology for the design of the new urban elements for the desired public realm of the near future, as well as provide interesting design solutions.

> "Architecture and planning appear to be fertile fields for transdisciplinary contributions due to their very nature as "multidisciplinary" disciplines involving both natural and social sciences, and action-oriented practices aimed at transforming the built and natural environment, as well as educational programs based on multidimensional problem solving." (Lawrence & Després, 2004, p. 397)

Architecture and urban planning have traditionally followed a set of pre-established rules and regulations within a specific corporate framework. However, urban design at the human scale, when focused on the street, involves a wide range of elements from the minimum dimension of sensors and street furniture to the design of sections that incorporate traffic lanes and buildings within the constraints of urban regulations and planning. Following Gehl's methodology, we believe that street design requires a transdisciplinary approach that combines technological functionality with a subjective understanding informed by humanities disciplines such as sociology, psychology of perception, and art, among others (Gehl & Svarre, 2013). Figure 1 graphically interprets the 'typical' map in which cross-disciplinary research and practice work, following Muratovski's (2011) definitions. On the horizontal level interdisciplinary interaction, while multidisciplinary work is represented on the vertical axis. We will see later that 'trans-disciplinarity' transcends this Cartesian simplification.

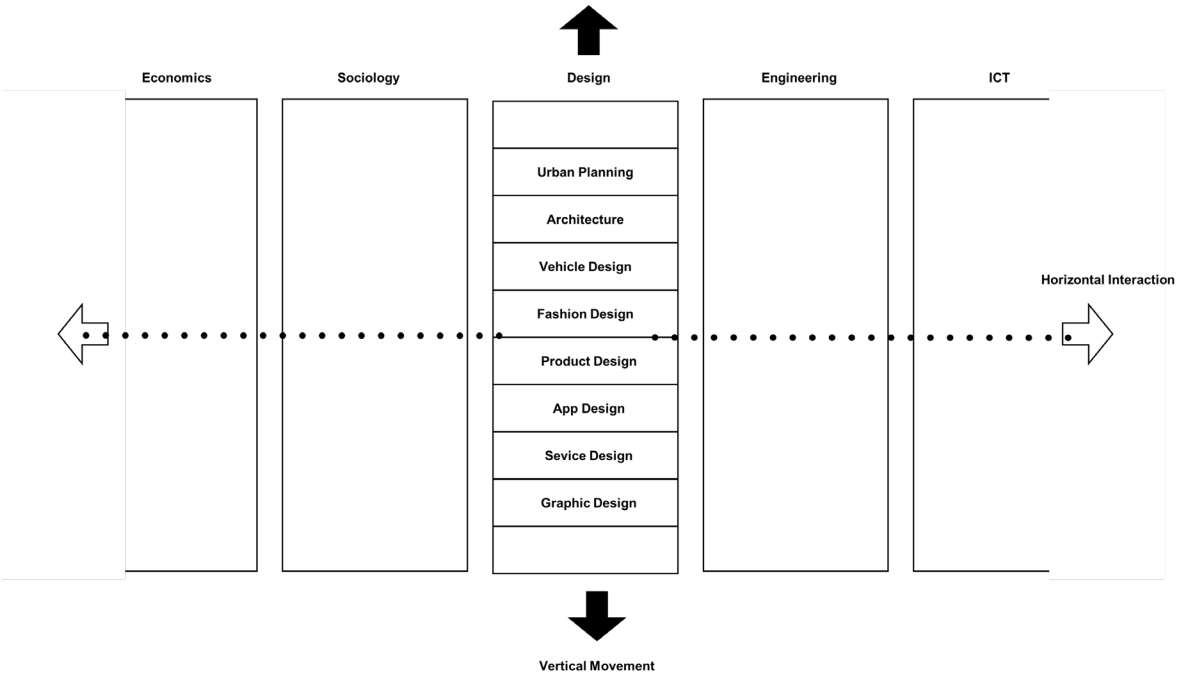

Figure 1. Cross-disciplinary Horizontal- Vertical interactions between disciplines. Horizonal interaction: inter-disciplinarity. Vertical interaction: multi-disciplinarity. Following Muratovsky's definitions.

Today, progressively disruptive changes in society, calling for a more inclusive approach to social equality, sustainability, and climate change awareness at a time when technology is omnipresent, further underline the need for a completely new, more complex, and rigorous approach to street-level design in urban planning that calls for a transdisciplinary paradigm shift. The difficulty of addressing street-level interactions and perceptions directly refers to Deleuze and Guattari's concepts of society, according to whom latitudes together constitute Nature, the plane of immanence or consistency, which is always variable and is constantly being altered, composed and recomposed, by individuals and communities (Deleuze and Guattari, 1972).

This article describes the process, methodology, and initial results of the design of the elements and components of urban space, toward the creation of street furniture for more sustainable and equitable streets. It also explores how street design is evolving, and how it may transform in the future as concerns about sustainability, road safety and quality of life in cities are pressing to reconsider how we design our streets and how we use them in a new era for mobility (Sádaba, 2019).

This project aims to contribute to the reflection on the future of streets in the urban context and propose innovative solutions to improve urban design and quality of life in cities while addressing the limitations of traditional research methods in the field of urban design, and proposing a transdisciplinary approach that integrates different perspectives and disciplines. As pointed out by Friedman (2003, p. 509) : "lack of method and a systematic and comprehensive understanding are common causes of failure in urban design, so research and theory play a key role in this field".

In this context, we describe the first phase of a 12+12-month research project funded by the Basque Government. Started in November 2022, the project is led by the School of Architecture and the School of Engineering of the Basque Country in collaboration with a major manufacturer of street furniture and road elements. The objective of the project is to generate street elements and components for more sustainable and equitable streets. It details the approach, objectives, and methodology of the project, which is being piloted in two urban areas proposed by the Bilbao City Council: the Pio Baroja square and a specific urban section that expands throughout the city. The research project is closely aligned with the objectives of the Euskadi 2030 Science, Technology, and Innovation Plan (Basque Government, 2019), and it specifically references three important programs: the Horizon Europe Framework program, the Digital Europe program, and the European Green Pact. The primary aim of the project is to create innovative products that meet the needs of a society and an economy that are transitioning towards sustainability.

2. Literature Review. State of the Art

Research in urban design and architecture is evolving towards creating more sustainable and liveable cities that use fewer resources and are more resilient to climate change (Ghesmi Shah Galdi et al., 2017). This evolution runs parallel to the paradigm shift that cities are undergoing about the way they are conceived, designed, and inhabited, which will require profound transformations in all areas. In this process of minimizing consumption and optimizing uses and spaces, it will be important to reduce the presence of obsolete urban elements that clutter cities with unnecessary objects and forms. Instead, urban elements and fabrics should be considered more holistically as part of an ecosystem in which human presence is shared with other components, both living and inert.

Mulder (2016) has recently highlighted the importance of thinking of urban elements as part of a wider network of ecological systems and of planning the use of sustainable and recyclable materials in their construction. The use of symbiotic, parasitic, or hybrid urban elements, which reuse existing urban components, can be an effective way to reduce resource consumption and minimize the environmental footprint of cities (Ahern, 2011). In this sense, according to He & Reith (2022), efficiency, durability and flexibility are key factors in sustainable urban design. This approach highlights the importance of modularity and scalability in the design of urban elements and suggests the use of durable and recyclable materials, such as stainless steel, to build families of modular elements that can be combined as needed. Contemporary urban design must adapt to new forms of mobility and transportation. The shift away from the use of cars in cities towards more sustainable alternatives such as public transport, personal mobility vehicles, bicycles, and walking, is transforming the urban landscape (Friedman, 2021). Removing the private car from the streets can free up valuable space for other uses such as bike lanes, wider sidewalks, green spaces, and public spaces for community activities. Therefore, urban planning and its elements should carefully consider how public space is allocated and used to foster a more friendly and accessible urban environment. Urban design can influence residents' transportation choices: Access to a wide range of services and activities as well as the ease of getting around a city are key factors that influence citizens' choice of transportation (Richter & Weiland, 2022).

There is a need for a transdisciplinary approach in the research and practice of urban design and architecture to effectively answer the challenges highlighted above. We posit that the lack of collaboration between disciplines in urban construction is an obstacle to the creation of sustainable and liveable cities, and disciplinary fragmentation in urban planning and the lack of a holistic long-term vision are barriers to the transition to more sustainable cities (Mrak et al., 2022). Lawrence (2022) highlights the need for a transdisciplinary approach in urban design research and practice to address public health challenges in cities. Collaboration between architects, urban planners, designers, sociologists, epidemiologists, and other professionals is essential for understanding and addressing the complex interactions between the built environment, human behaviour, and health in cities.

Minimizing the presence of obsolete urban elements and considering urban components as part of a broader ecosystem are important objectives in the current research on urban design and architecture. The need to rethink urban space in relation to transition from a massive automobile use to a growing use of other types of mobility is essential to promote more sustainable and liveable cities in the future. The use of modular and scalable urban elements, built with sustainable and recyclable materials, might be considered an effective practice in support of this transition.

3. Materials: Preliminary Analysis and Guidelines

In this first phase of the project, the research team conducted a preliminary analysis to identify the site for a pilot study that was later used to inform the design of a transdisciplinary methodology that will be adopted and validated during the project's second phase. The pilot study included the definition of criteria for the selection of the study's site, the analysis of the site, and semi-structured interviews to selected stakeholders.

3.1 Site of the Study

Urban street-level research requires working on a specific site that allows to collect specific data and test working hypothesios before, during, and after the prototyping phase. To identify the proper site for this study, we applied a series of criteria defined in collaboration with the Bilbao Municipality's technical team. The final choice focussed on the site that met the highest number of listed requirements. The list of desired characteristics included the presence of:

- Car lanes
- Pedestrian walkways
- Bikes and Personal Mobility Vehicles (PMV) lanes
- Light Train circulation
- Bus platforms
- Areas for the loading and unloading of goods
- Relax areas (e.g., areas with benches)
- Children playgrounds
- Senior exercise areas
- Retail
- Green areas
- Any other remarkable public activity (e.g., areas dedicated to pets' strolling)

Following these criteria, we selected a recently revamped site - the Pío Baroja Square (Plaza Pío Baroja, Fig.2) - for a pilot study with the goal of collecting initial data to define preliminary methodological guidelines.

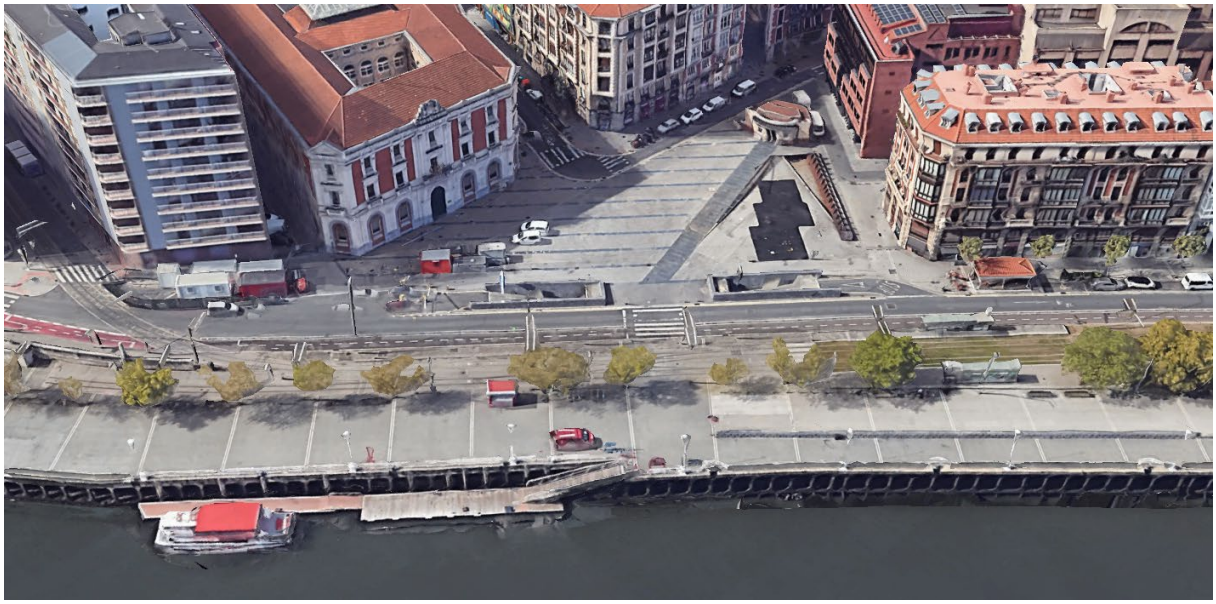

Figure 2. View of Plaza Pio Baroja. Source: Google Earth.

Plaza Pío Baroja is currently undergoing a landscape-oriented transformation project which will feature green areas, leisure spaces, and areas for relaxation. Our pilot study included the assessment of the prior and future characteristics of the site to identify current gaps and potential for the design of new urban furniture. Figure 3 shows a 3D-models comparison of the current sit (to the left) with the project, approved by the Municipalilty of Bilbao, for the future square (to the right).

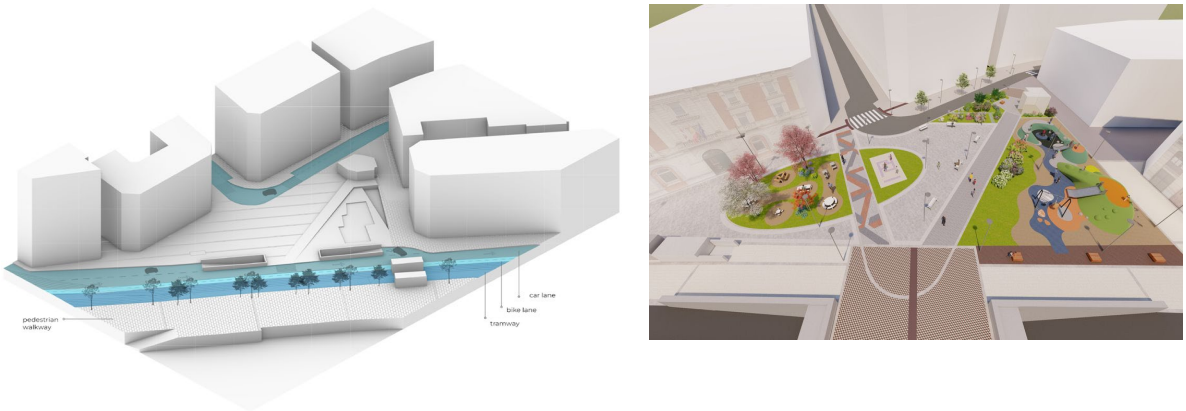

Figure 3. 3D Model of Plaza Pío Baroja: current (3D by the authors) and future designs (Source Bilbao.eus).

The site provides an excellent opportunity to study the transformation of urban public spaces, as it includes pedestrian and car lanes, light train platforms, playgrounds, leisure/relaxation spaces, and even a boat pier on the river bank. It is important to note that our project does not aim to compete with the existing project, which effectively addresses current needs and includes the necessary urban furniture. Instead, our goal is to identify potential areas of opportunity for improving future mobility and public space enjoyment possibilities. In a recent analysis, the Municipality of Bilbao (2022) observes how the Plaza serves as an important transit space in the city, used by different types of transportation that include private vehicles, bicycles, and pedestrians. However, access to the Plaza for people with disabilities is made difficult by the presence of physical barriers. Additionally, the Municipality identified a clear opportunity to improve the square's connection to the city's main public transport nodes, which could encourage the use of public transport and reduce private vehicle traffic.

The plaza is a space used primarily for the transit of people and vehicles and currently does not have adequate resting or recreational spaces. An opportunity has been identified to improve the urban furniture of the square, including the incorporation of modular and scalable elements that allow space to be adapted to different needs and uses. Hospitality and food outlets represent most of the buildings around, which are not adequately integrated into the public space. As such, they can generate noise and dirt. An opportunity has been identified to rethink the commercial use of the square with the aim of promoting the integration of commercial establishments with the public space and improve the quality of the services offered.

In summary, the analysis of Plaza Pío Baroja in Bilbao identified several opportunities to improve the urban design of the square, including improving accessibility and mobility, integrating living elements into the public space, and improving street furniture.

3.2. Stakeholders Interviews: Emerging Themes

The research team conducted semi-structured interviews with stakeholders: artists specialised in intervensions in the public space, traffic engineers, representatives of grassroots movementes, citizens, and politicians (including the counseslor in charge of pubic works and strategic projects of the Municipality of Bilbao). In total, four people were interviewed at the time of writing, two men and two women. Interviews were analysed through qualitative text analysis (Kucartz, 2014) to identify emerging themes: the changes in the perception and usage of the city's space; the need for new urban design; the desired characteristics of future urban furniture; the changes related to mobility.

- Changes in the Urban Space
- There is a clear shift in the urban space from a focus on the car to the pedestrian as the main protagonist ("[urban space] *has been changing first putting the pedestrian as the protagonist*"). This change impacts the way the city space is perceived ("*streets should be more usable and more habitable, not only as transit areas but as areas where to stay and spend time*"). Different generations experience the city space differently and have different needs: "[we need to] *solve how older people move within their neighbourhood and in communication with other neighbourhoods*" , "*boys and girls have streets where they can play, spaces where they can play and that they can enjoy*". Finally, a human-centred city would trigger a virtuous circle and support local economy: "*The other important element is the commercial issue, that these friendlier and more pedestrian spaces should also serve in a certain way to sustain local commerce*."
- Needs for New Urban Design
- Interviewees have highlighted how an improved design of the public space could benefit homeowners ("*general improvement of the neighbourhood through public space is going to mean a revaluation of the properties*") and that a certain customisation of the city areas is to be expected ("*the design of the public space is like going for a tailor-made suit for each neighbourhood*"). Finally, public space stakeholders are not only human beings. We have to take into account the needs of other species, too ("*more and more dogs*", "*You have to see how you separate the children's area from the area where pets can be*").
- Urban Furniture
  The quest for reusable materials and customisable urban furniture emerges clearly in sentences such as "there is a very wide and varied offer of urban furniture elements, but they badly last in public space because perhaps they are not well thought out from

the point of view of vandalism" and "unfortunately it is not foreseen that parts of this furniture can be disassembled".

- Mobility
- Mobility is crucial for the future of cities, not only from the point of view of the design of the city's logistical infrastructure ("*The urban distribution of goods... is generating a greater demand for logistics spaces in loading and unloading areas around the city*") but it also impacts the social organisation of spaces and habits ("*This model is strained to the extent that you have a lot of last-mile couriers who are not serving the business but are serving the individual, eh, with which you have more actors for the same number of loading and unloading areas*", "[the use of PMV] *causes tensions of coexistence*".
- Keys to Good Urban Design
  Finally, the keys to a good urban design for the future seem to be the attention to "usable space, that is to say, there are designs that are very beautiful but that limit the use and the use cannot be subordinated to the design", while increasing the focus on "safety and perception of safety", also taking into account "elements of cultural identity in neighbourhoods as far as possible".

From the analysis of the site and of the interviews, we derived a series of preliminary themes that will inform the 'Pre-findings' (see Section 4) that are at the core of the methodological framework we describe in the following section. Some of the Pre-findings 'mottos' for the urban furniture of the future, emerged from the pilot study are:

- No more shapes/design on the streets. Minimize 'design'.
- Identify types of spaces and facilitate usage: delivery spots, relax spots, quiet spots…
- Car mobility not protagonist. Facilitate multiple light diverse mobility types.
- Anti-vandalic and easy to change/replace elements by parts.
- Adaptive to changes.
- Generate identity.
- Tailor-made projects.

As we will describe in the following Section, the Pre-findings form an integral part of the transdisciplinary methodology we propose, that will be applied and validated in the next phases of the research project.

4. Methods. Defining a Transdisciplinary Methodology

As Blassingame (1998) points out, the sustainable city remains a utopia. Despite decades of research and public policy, we have not yet found an effective way to transform our cities into sustainable communities. Therefore, it is crucial that urban problems are approached from a more transdisciplinary perspective and new methodologies are established to address contemporary urban challenges. The aim of this research is to contribute to the definition of a transdisciplinary methodology that combines technology, people, and the urban space to design intelligent urban furniture that adapts to the needs of users and address the specific needs of the city (Wever et al., 2008). Trans-disciplinarity is often identified as the desired methodology to push the boundaries and overcome the limits of the more imperfect multi-disciplinarity and inter-disciplinarity (Muratovski, 2011; Lawrence & Després, 2004). According to Muratovski, transdisciplinarity happens "when designers have achieved a sufficient level of knowledge to enable them to work across disciplines in new and innovative ways" (2016, p.59). While multidisciplinarity happens when architects, urban

planners and product designers work together, interdisciplinarity marks the encounter of more distant disciplines (for instance, architecture and sociology) on the same project. Here we argue for *trans*disciplinary ways of working: a *fusion of disciplines* – a way of working in which designers have transgressed (or 'transcended') their own disciplinary norms and adopted ways of working from other disciplines.

4.1. Project Framework: A Transdisciplinary Toolkit

Following the principles of transdisciplinary sustainability research described by (Lang et al., 2012) and through a systemic approach that focuses on sustainability and efficiency (Stasinopoulos et al., 2009), we defined an iterative process that integrates multiple disciplines. By adopting these methodologies, we believe we will be able to address challenges more effectively and achieve more sustainable and lasting results in our project.

The work method illustrated in Figure 4 shows how qualitative and quantitative methods and sub-methods (on the left) and disciplines (on the right) operate over the building blocks created from our first Pre-findings. Sectorial disciplinary inputs, listed on the right, reflect the composition of the research team. Each discipline will never add alone, and interwoven inputs will always be conveyed and gathered. The ten methods and sub-methods listed on the left also reflect the expertise of the research team and can be applied to different disciplines. The combination of disciplines and methods blended with the Pre-findings, iteratively generates building blocks that are continually updated and on which the construction of the urban furniture design (the goal of the research project) is pursued and validated.

In Figure 4, Methods, Pre-findings, and Disciplines interconnect as an interactive system where the "interactions among diverse agents, integration of multiple systems, interconnectivity between organizational levels, and iteration over time" (Nogueira, 2023) interplay towards the definition of a new design framework.

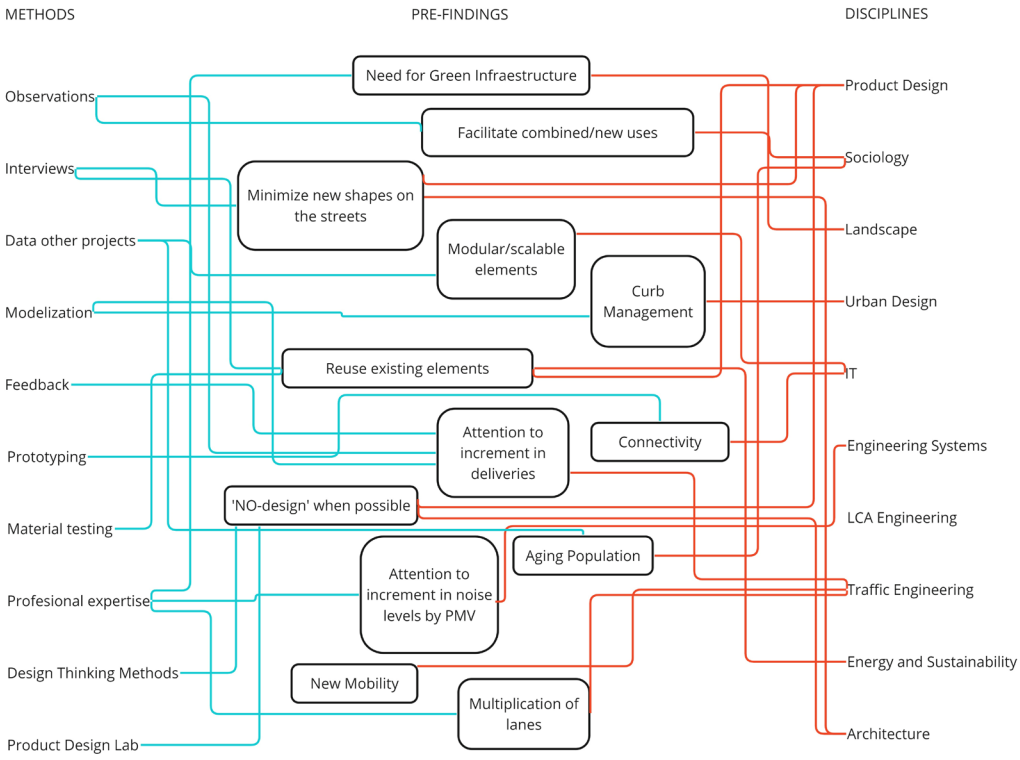

Figure 4. Transdisciplinary triple toolkit: Disciplines + Methods = Pre-findings (dynamic Building Blocks).

The methodologies and sub-methodologies used in the research (left column in Fig. 4) include:

- *Observations*. Observations on the area and counting of traffic flows and pedestrian activity are conducted.
- *Interviews*. Four people were interviewed so far: the urban design and strategic projects counsellor of the City of Bilbao; the lead engineer of one of the main traffic analysis companies in the area; an artist working on urban space and a citizen.
- *Modelling and Prototyping*. We modelled the two sites identified for the project and input different possibilities. Models are done with 3D rendering and 3D printing.
- *Expert Feedback* after every subphase is gathered, stored, and analysed.
- *Product Design Lab:* prototyping and material testing.
- *Design Thinking Methods* like Pugh Charts and brainstorming sessions are used to support teamwork in each stage of the project.
- *Professional expertise and Data from previous projects*. Reflection in Action, as understood by Schön (1991), is a key element of this process. The team is asked to take reflection notes to capitalise on the previous experience of the team members (architects, engineers, entrepreneurs, geographers, computer scientists). Data and expertise from other urban furniture and public space projects from the team in which a base element hosts a multiplicity of components for different uses are used as a form of inspiration for the project. For instance, as shown in Figure 5, previous projects from one of the co-authors such as Birloki (Gómez-Carmona et al., 2022), Urban e-pizza, Smartoki and Mugi_Adi).

Figure 5. Birloki, Mugi_Adi, Smartoki, Urban Pizza. Previous Base+Mocules projects for Urban Spaces.

4.2. Project Workflow: The Meeting Points

We consider so-called Pre-findings as dynamic 'Building Blocks' that emerge during the work process overviewed in Figure 6. In the workflow, the team (and sub-teams) meet regularly at so-called 'Meeting Points' where Methods and Disciplines interact to define emerging Pre-findings.

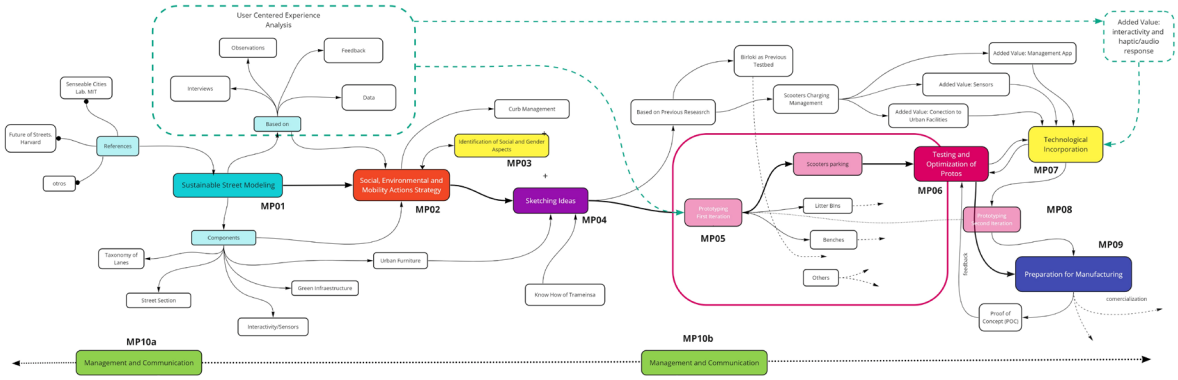

Figure 6. Overview of the workflow based on Meeting Points (MP).

Meeting Points are activators of tasks and deliverables where actions, ideas, and team members gather and exchange knowledge by using methods and sub-methods from the toolkit to progressively shape the building blocks of the project. The total duration of the project is divided into two phases: (a) The definition of the city requirements and (b) The design of specific urban elements.

Figure 6a and 6b zoom in the details of how the four Meeting Points for Phase a) and the six for Phase b) interact with the development of the project and the Pre-findings.

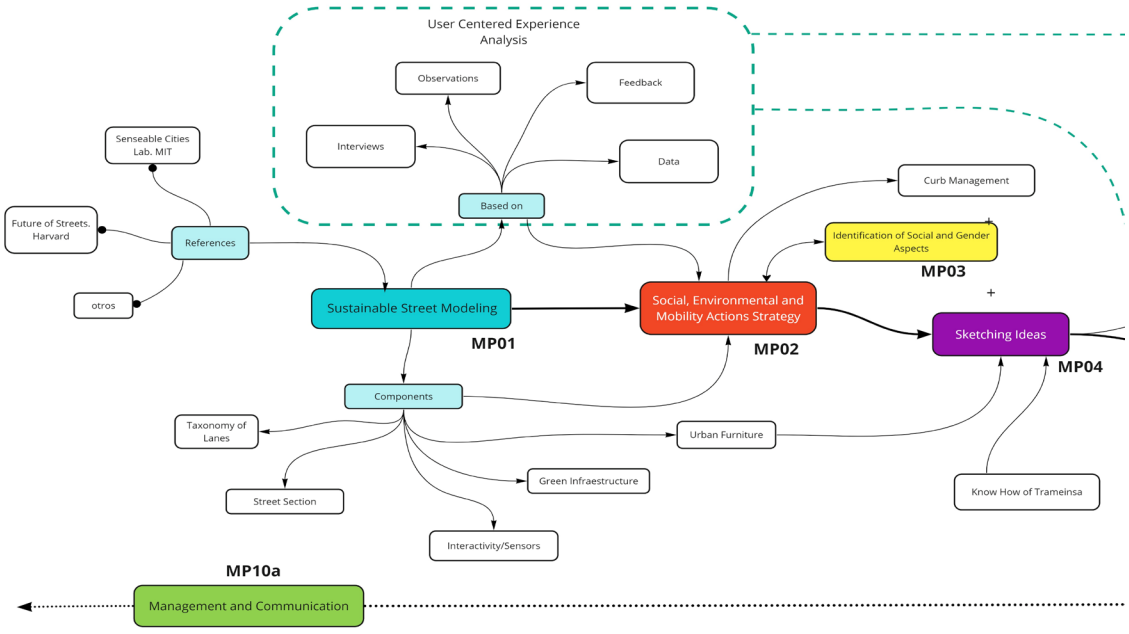

Figure 6a. Details of the four Meeting Points for Phase a).

- **Meeting Point (MP) 01.** Sustainable Street modelling. By modelling the sites of the project, we analysed the existing aspects of the current street and identified what elements should be modified. This modelling serves as a graphic basis for the study and communication of the progress of the project to the team and the other partners.

- **Meeting Point 02.** Strategy for Technical, Social and Mobility Actions. To achieve a more inclusive city model, we evaluate how the street components identified in MP01 feed into the management of the city's curbs.
- **Meeting Point 03.** Identification of the social and gender aspects to be incorporated into a sustainable city. The incorporation of the physical elements of the street (section, lanes, architecture, and urban furniture) and the social consequences of these elements are leveraged to foster a more inclusive city space.
- **Meeting Point 04.** First sketches and ideas for furniture and solutions, informed by the previous MPs. This phase pools the work of designers, architects, artists, and engineers.

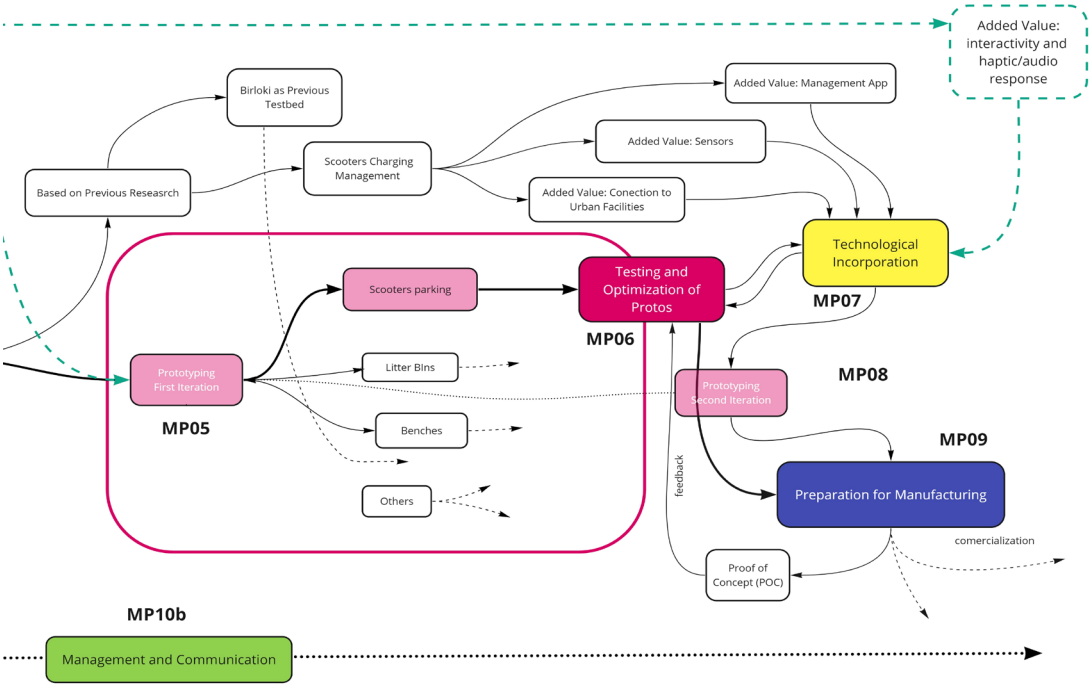

Figure 6b. Details of the four Meeting Points for Phase b).

- **Meeting Point 05.** First iteration of the prototype. The first prototypes will be created in the FabLab of the Architecture School, using programs such as Grasshopper, Rhinoceros, BIM, and 3D printing. As many prototypes as possible are created in order to carry out evaluation activities and comparative studies.
- **Meeting Point 06.** Testing and optimisation of the prototypes: Bionic design aspects, LCA testing of prototypes and circular economy. In this task, and as a continuation of the previous one, the Bill of Materials (BOM) of the technical and electronic components is incorporated into the prototype of the industrial model. Bionic design, Life Cycle Assessment and other material-related aspects are brought into the design process by the engineering sub-team. Testing of iterative prototypes in conducted.
- **Meeting Point 07.** Incorporating the technological layer. In this task, the integration of the hardware and software components (e.g., network connectivity, environmental sensors, electric vehicles charges) is implemented. A testing environment is set up in the lab and all the technical documentation is prepared for manufacturing.

- **Meeting Point 08.** Second iteration: integration, evaluation, and validation. We will verify the compliance of the proposed solution with existing regulations and with the objectives of the project.
- **Meeting Point 09.** Preparation for industrial manufacturing. In this phase, we will define a global plan for the commercialisation of the product that integrates the different economic, technical, commercial, and manufacturing to evaluate the entire life cycle of the new urban furniture.
- **Meeting Point 10 (a and b).** Management and technical coordination of the project. This task is carried out throughout the entire project.

5. Pilot Study: Analysis and Early Results.

As we approach the end of the first phase of the project, we formalised the first sketches of the future urban furniture (MP04) to enter the prototyping phase (MP05). Figure 7 shows the initial sketches of the modular urban elements that emerged through the proposed transdisciplinary process based on the intercorrelation of Methods, Disciplines and Pre-findings.

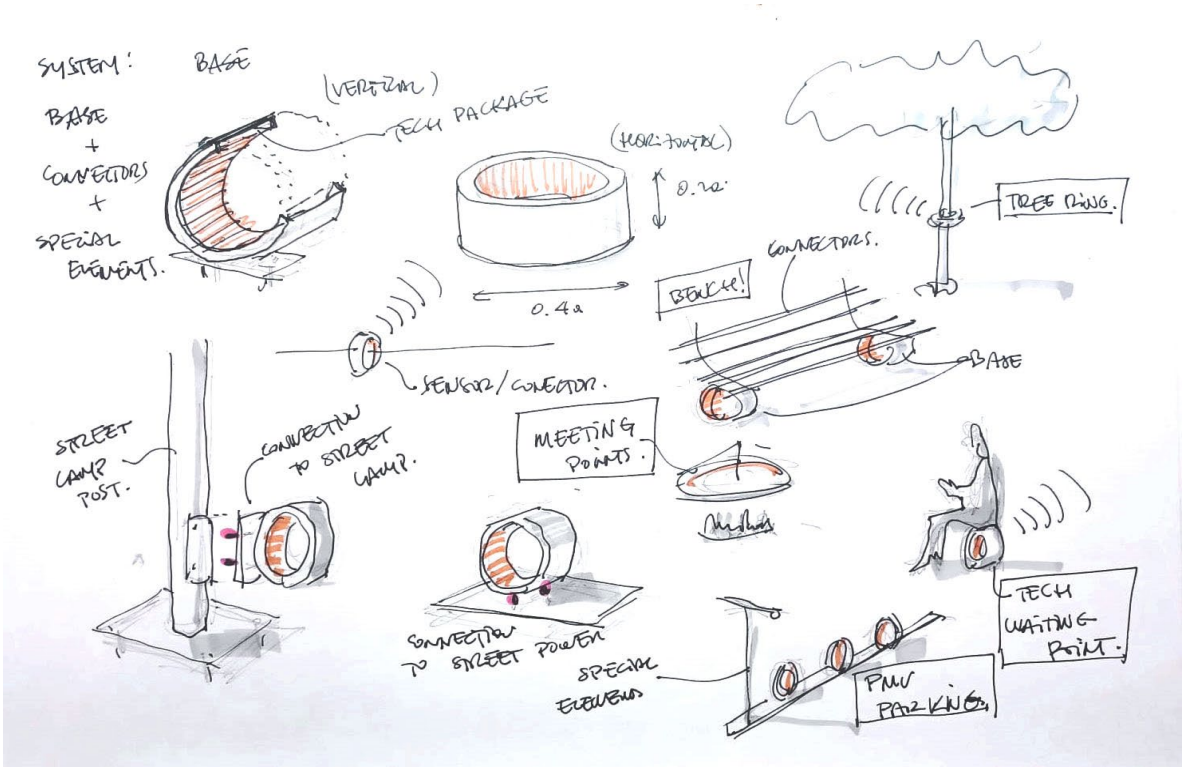

Figure 7. Sketching the system. Base elements + connector elements + individual elements + material language.

The sketches are deeply influenced by the building block 'No -Design' (Fig.4) that is, minimizing the introduction of new shapes in the streets and using what is already there to guide the form-giving process, which is a self-imposed condition of our design team. We see the city as the interconnection of individual elements, modular components, and events. Starting from the most indivisible unit – the unitary elements of urban furniture – we want to:

- Minimize the presence of urban elements and avoid further clogging of the city with objects and shapes.

- Think of the street as a real ecosystem, where human presence is shared with other components, both living and inert, transformed and not transformed.
- Enable the introduction of a new concept of symbiotic, parasitic, or vampiric urban elements where existing urban components can be used or reused.
- Use stainless steel as a root and a compositional base to create a family of modular, scalable, and combinable elements. Stainless steel provides durability and formal elegance but, at the same time, it is a material that allows us to maintain the desirable traceability criteria proper of the circular economy.

The formal hypothesis on which we will work as a starting point is **the stainless-steel ring** (Figure 8).

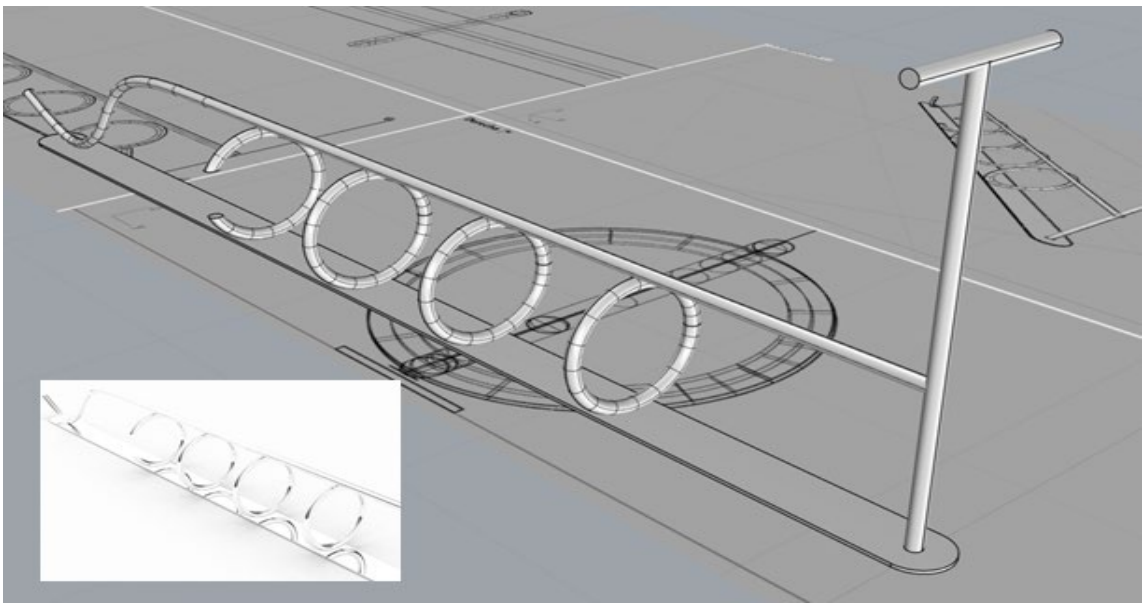

Figure 8. Drafting potential specific solutions.

On the macro scale, through the analysis of the pilot study's site (Plaza Pío Baroja, see Section 2), we identified several areas of action (see Figure 9) where the family of urban furniture elements can be deployed. On a first layer that identifies the site's 'structure of events' as defined by Koolhaas (see Lenzi et al., 2021) we will plug what we call 'parasitic' or 'vampiric' urban furniture elements, that leverage the existing infrastructure of the site to comply with the 'No Design' building block.

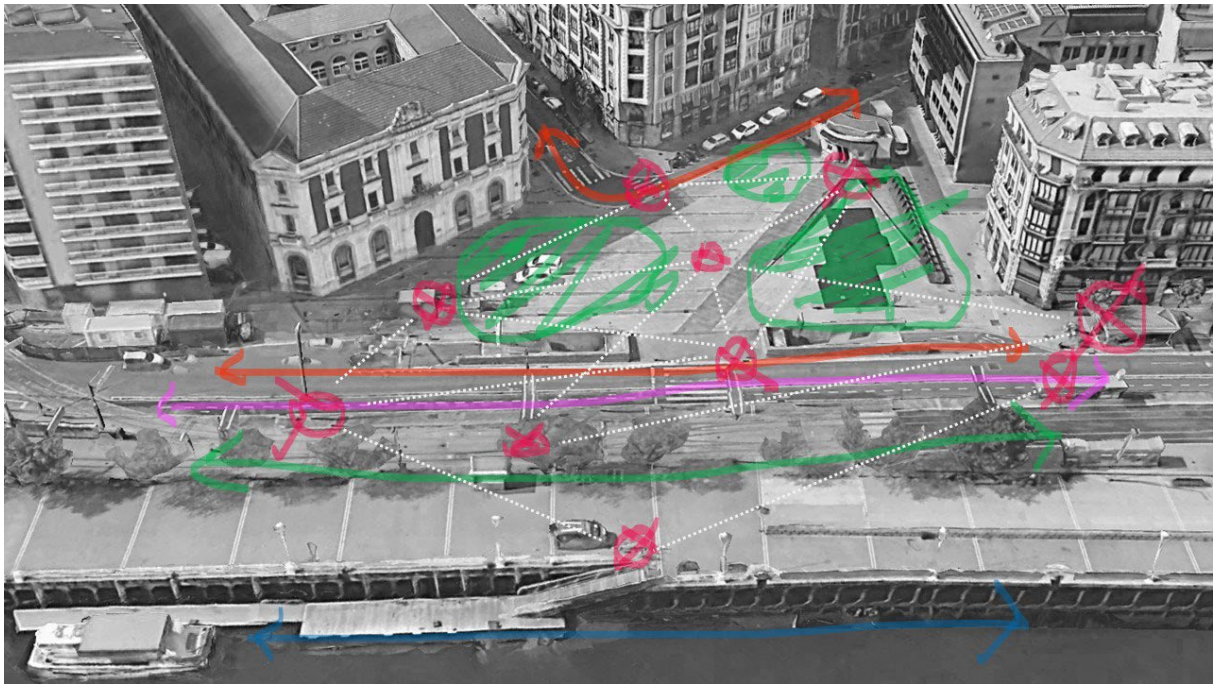

Figure 9. Mapping Structures of Events in green, connection (parasitic-vampiric spots) in red and lines of action in purple, orange and blue.

The statement that the term "urban furniture" is obsolete and evokes static situations (Bertram, 2017) is reflective of a shift in urban design towards a more dynamic and integrated approach. This shift is characterized by a focus on the street as an ecosystem, where human presence is shared with other living and inert components, transformed, and not transformed. This concept is in line with the principles of sustainable urbanism, which emphasizes the importance of creating urban environments that are functional, aesthetically pleasing, and socially inclusive.

The use of stainless steel as a base material for urban design elements is reflective of a growing interest in sustainable and recyclable materials and the possibilities to introduce bionic design solutions that minimize waste and environmental impact. Additionally, the emphasis on a modular and scalable set of elements allows for flexibility and adaptability in urban design, which is essential in creating resilient and responsive urban environments. The concept of a ‘vampiric’ connection in urban furniture design, where elements are connected in a way that maximizes efficiency and minimizes waste, is an innovative approach to sustainable design. This approach is supported by research that has shown the benefits of using circular economy principles in urban design, emphasising the importance of reducing waste, reusing materials, and recycling resources (Allahdadi, 2017).

6. Discussion and Future Work

We strongly believe in the need for a proper balance between the results of scientific research and iterative design practice. After sketching the definition of a new transdisciplinary approach to the design of urban furniture for the future city, we conducted a pilot study that reflected Phase a) of our research project and provided us with the opportunity to conduct a first evaluation of our proposed methodology. The pilot study was also the opportunity to sketch the design of new furniture – which is one of the desired outcomes of the research project - through a trial-error process typical of design practice.

Our transdisciplinary approach to the design method grounded in Meeting Points located all along the work process, and the interplay of methods and disciplines that build dynamically constructive building blocks is fruitfully guiding both our theoretical and practical activity. As a first result, we identified a clear design direction that relies on a modular system of urban furniture (rather than a closed formal artifact) that complies with the complex regulatory requirements of the public space and meets the needs emerged from the stakeholders' interviews, the review of literature, and the analysis of previous projects.

The design system, preliminary called UTS (Universal Yet-Tailored Solution) that is now entering the prototyping stage, will be conceptually based on system of connected voids that use the simplicity of stainless steel to minimise the introduction of new shapes into the city space. The elements will – as modern vampires – absorb the energy already provided for lamp posts and other street utilities at specific strategic connection spots. They will symbiotically occupy the curb based on the analysis of the structure of events that, as emerged from the interviews, needs to take into account a variety of activities (deliveries, entertainment, old and new mobility) and a variety of stakeholders (human and non-human). All the individual elements of the furniture will be modular and easily interchangeable.

The transdisciplinary method proposed in this paper supported the design phase and will be used in the next steps to evaluate the validity of the prototypes and iterate the design. Conversely, the prototypes will inform the refinement of the transdisciplinary methodology towards the definition of usable guidelines. We believe that the interplay of action and reflection can foster a more integrated approach to the design of street-level interactive elements that can contribute to a better framing of the scope for transdisciplinary research in Architecture and Urban Design.

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