

Strategic Design for Mobility: Study of a Methodology for the Analysis of User Behavior and Choices Regarding Mobility

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ABSTRACT

The study of user behavior and mobility choices is crucial for the design of innovative transportation services that truly cater to people's needs, placing the user and their perceptions at the forefront, developing services that consider not only the necessities, but also individual sense-making (Pennington, 2016). To achieve this goal, the design team developed a strategy for mapping qualitative and quantitative data, including the identification of user needs and frustrations. A pivotal element was the utilization of Personas, a method introduced by Cooper in 1999, which guided designers to carefully consider the specific needs of users (Cooper, 1999). These Personas were crafted through meticulous observation and a significant number of user interviews. The gathered information was then translated into Personas, pinpointing common needs, frustrations, dreams, and fears (Çalışkan, 2012). The primary objective was to develop a scalable approach to easily grasp local needs, concerns, trends, and opportunities related to mobility systems, walkability, road desirability, and services (Dogan, T., 2018). This methodology was applied in the analysis of two specific mobility hubs in Palermo, namely, two stations within the city's metro system, which are pivotal and intricate nodes serving diverse user bases (Turner, D.W., 2010). Contextual analysis was complemented by participatory observations, discussions with users, and empathic interviews to identify their needs and motivations behind their choices (Kalbach, 2020). The designers also captured photographs, marking the most intriguing nodes, strengths, and weaknesses according to the users, and analyzed them to create proto-empathy maps (Califano et al., 2022). The ultimate goal was to develop qualitative maps of users' daily experiences, referred to as "User Journey Maps," and empathy maps, tracing their emotions to identify needs and frustrations (Tharon, H., 2014). This methodology was designed to be easily adaptable in other contexts, which could prove invaluable in the future of the research project. In summary, the strategy developed by the design team provided valuable insights into user behavior and mobility choices. The use of design tools, such as empathy maps and Personas, contributed to creating profiles useful for deepening the design process, as well as for conducting a testing phase. The combination of methodologies was effective in achieving a new level of mapping to be integrated into the mobility service design processes.

Keywords: Urban design, Design methodology, Design thinking, Urban planning, Walkability, Sensemaking, Personas

INTRODUCTION

Investigating user behavior and mobility decisions is vital for the formulation of cutting-edge transport solutions. To this end, the design group crafted an observational methodology as part of the “Urban Mapping and Sensing Project’s Geographical and Societal Context”. The goal was to devise a versatile method for swiftly grasping the local requirements, concerns, prevailing trends, and potentialities linked to mobility infrastructures. This study was carried out in partnership with the master’s program laboratory focused on territorial planning, under the domain of strategic and territorial development services and in the research framework of Italian Sustainable Mobility Center - Spoke 9 “Urban Mobility”. The user exploration process was segmented into straightforward stages, simplified further by reference guidelines (see Figure 1), in order to contribute to define a new integrated and consistent mobility and urban planning strategical approach.

The design team conducted a comprehensive analysis of two major mobility hubs in Palermo, involving desk research, expert opinions, field observations, and photo evaluations to develop initial empathy maps and proto-personas. This progressed to creating interview guides, conducting interviews, and analyzing data to construct detailed user profiles and improve urban and mobility planning. The methodology was then refined for broader application across various contexts in Palermo and other Italian areas, highlighting the crucial role of observational strategies and design tools in understanding user behavior, forming detailed user profiles, and enhancing the overall design process while maintaining flexibility for future research.

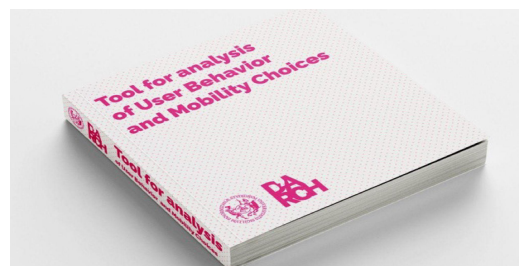


Figure 1: Manual of guidelines for operators.

THEORETICAL FRAMEWORK

Infrastructure, mobility and the city. An integrated approach

In recent studies and applied experiences, the strategies for enhancing the quality of public space are inevitably connected to an incremental and adaptive vision of urban transformation (Carta, 2021b, pp. 406–407). This vision has been accelerated and accentuated by the pandemic phase, which has required a rethinking of how city users interact with public spaces (D’onofrio & Trusiani, 2022).

Marchigiani & Bonfantini (2022) and Carta (2021b, pp. 406–407, 2022, pp. 153–168) underline the significant impact of the pandemic on reshaping

the concept of neighborhood planning. This new vision focuses on revitalizing physical spaces and providing local services within a framework of increasingly integrated and multisectoral policies. These policies span a spectrum of complexity, from short-term Covid-19 strategies to long-term transformative initiatives (Casanova & Hernandez, 2015; Mostafavi & Doherty, 2016, pp. 428–431; NACTO & Global Designing Cities Initiative, 2020).

Even the “Ottavo rapporto sulle città – Mobilità e Città: verso una post-car city” (Coppola et al., 2023, pp. 57–68) describing the case studies of Milan, emphasizes a desire to return to neighborhood-based urban design as a reference point for communities. It highlights the importance of tactics like Tactical Urbanism (Lydon & Garcia, 2015) and Urban Acupuncture (Casanova & Hernandez, 2015) in the city’s “restart” with a citizen-centered approach rather than a focus on specific transportation categories (pedestrian, cyclist, driver, and so on).

Thanks to the increased awareness in recent years (Carta, 2021a; Coppola & Silvestri, 2021; D’onofrio & Trusiani, 2022; Gehl & Svarre, 2013; Marchigiani & Bonfantini, 2022; Žnidaršič & Juvančič, 2021) the city of sustainable spaces is increasingly imagined and designed as a citizen-friendly place, and no longer exclusively pedestrian-friendly.

Thus, a paradigm shift has occurred in which the livability of our cities is once again measured by the dimension of the human being (Forsyth, 2015; Žnidaršič & Juvančič, 2021), not only from a strictly functional perspective but also from a perceptual (Lynch, 1964) and well-being standpoint (Bonaiuto et al., 2015).

In a qualitative and quantitative approach, the main requirement is to integrate subjective components focused on the individual with objective components based on evidence. This integration occurs within a decision-making context where behaviors result from the interaction between purely objective aspects (e.g., road quality, lighting, slope, etc.) and exclusively subjective aspects (e.g., sense of safety and security, architectural and artistic heritage, pleasantness of a place, etc.). This approach requires considering both the objective elements such as pavement quality, lighting, and slope, as well as the subjective elements such as the sense of safety and security, architectural and artistic heritage, and the overall pleasantness of a place (Bonaiuto & Fornara, 2017).

The development of coherent and integrated policies and the subsequent actions for the spatial transformation of cities, starting from urban mobility hubs, must be based on a strategic vision that works with adaptable groups of stakeholders. The user experience assessment belongs to a strategic approach in integration of urban planning, infrastructure and mobility services as the Sustainable Urban Mobility Plan (SUMP) Guidelines (Wefering et al., 2014) places particular emphasis on citizen and stakeholder engagement, policy and planning coordination across sectors (transportation, urban planning, environment, economic activities, social services, health, safety, energy, etc.), between entities, and across different levels within and across territories, as well as among neighbouring institutions.

This research delves into whether mobility experiences are consciously designed or naturally occur, emphasizing accessible and sustainable options in the urban citizenship context. The study highlights Mobility-Justice and Sustainable Mobility-Justice as major challenges, advocating for a comprehensive approach to ensure high-quality, eco-friendly public and private mobility services.

A critical evaluation of the existing mobility framework is essential to identify areas of high citizen expectations and inadequate service performance to prioritize improvements. A focus on key challenging intersections within public/private mobility services, identifying crucial moments and pain points, is necessary for significant enhancements (Kalbach, 2020).

METHODOLOGY: A SIX-STEP PROCESS.

This research integrates Design Thinking and Urban Design to create a powerful methodology for context-specific design initiatives, fostering innovation in complex settings. This integration supports reflective learning and enriching educational interactions, enhancing the understanding and engagement with intricate urban dynamics. This blend of methodologies provides a robust platform to address the complex challenges in urban environments, encouraging a culture of continuous learning and adaptation, aligning with wider discourses on informed and responsive engagement with complex, evolving urban ecosystems (Dogan, T., 2018).

The methodology thus employed is as follows:

1. Context analysis
2. On-site observation
3. Proto-personas
4. Interview guidelines and surveys
5. Personas and profiles
6. Validation

The concept of transdisciplinary design plays a vital role in this research, navigating complexity and encouraging innovative solutions within urban settings. This approach brings together varied perspectives from territorial social actors, utilizing observation, analysis, and dialogue to unveil novel design directions and insights. Illustrated through a case study conducted by scholar-practitioners and academics, the adaptability of this methodology is demonstrated across different urban design situations, ranging from walkability issues to scenarios necessitating engagement with potential residents. It delves into conflict resolution, generating opportunities, and strengthening territorial connections, all while striving to develop effective solutions to the challenges at hand.

Context analysis: The research team conducted an in-depth contextual analysis at the “Palazzo Reale Orleans” (see Figure 2), metropolitan station in Palermo to understand its dynamics, encompassing identification of key stakeholders, analysis of entrance/exit points and circulation within the station, assessment of peak usage times, and exploration of adjacent space usage during low patronage periods. This meticulous analysis yielded a wealth of

insights on the operational and spatial interactions at the station, laying a solid foundation for subsequent investigative and design-oriented efforts to address the challenges and opportunities within this urban setting.



Figure 2: Analysis of Nodes and Points of Interest at Orleans Station, Palermo.

Observation: Utilizing an observational tool, master's students from the "Design Cultura del Territorio" program aided in acquiring an in-depth comprehension of regular station users, positioning themselves at strategic vantage points for analysis across different time periods (refer to Figure 3). The process began by identifying target demographics and linking them to nearby points of interest or connectivity options, as illustrated by the association of a university's proximity with a predominant student user group. This meticulous methodology yielded a nuanced understanding of user dynamics and preferences, providing a time-variant snapshot of user patterns and offering valuable insights for informed design interventions.



Figure 3: Main Entrance of Orleans Station Royal Palace Palermo.

Proto Analysis (Proto-Personas; Proto User Journey Empathy-Map): Proto-analysis efficiently consolidates persona development, user journey mapping, and empathy mapping to swiftly generate actionable insights from user data, circumventing extensive resource investment and enabling a rapid, informed exploration of user dynamics for the critical refinement of design propositions.

Proto User Journey and Empathy Map Canvas: The integration of the Empathy Map and User Journey provides a comprehensive view into users' experiences, capturing their behaviors, desires, and concerns. The Empathy Map's main aim is to foster empathy towards a specific individual, requiring us to adopt their perspective, though it's acknowledged that this analysis is preliminary and requires further validation. This combination of tools aids in developing a detailed understanding of user interactions and experiences, forming a solid foundation for more in-depth analysis in later stages, with the provisional nature of this approach highlighting the necessity of ongoing validation to ensure accuracy and relevance.

Proto Personas: The persona serves as a unique user archetype with distinct goals in product or service interactions. Utilizing proto-personas based on initial observational insights, our methodology transitions to direct research for validation and refinement. These preliminary proto-personas, acting as a "minimum viable product" in user research, are instrumental in generating interview hypotheses and aiding in both structured and semi-structured queries, particularly crucial given the limited user data at this stage. This approach sets a foundational framework for deeper investigation as the research evolves.

Interview Guidelines and Surveys: Leveraging initial observations and proto-personas, a Semi-Structured Interview guide was created, allowing flexibility while targeting identified user groups, and facilitating the capture of subtle cues through tandem interviewing (Turner, D.W., 2010). A Structured survey, aligned with the Italian Ministry of Sustainable Mobility's guidelines, further explored individual mobility habits and openness to behavioral change, contributing to the development of sustainable mobility practices.

Develop User Journey and Empathy-Map Canvas: After the interviews, the focus shifts to refining user archetype profiles, necessitating the creation of User Journey Maps and Empathy Maps to capture user pathways and emotional responses, thus offering a comprehensive view of user interactions (Tharon, H., 2014). With data from interviews and observations, the process continues towards validating and evolving the Proto-Personas into detailed Personas, with particular attention to identifying genuine fears and needs (Çalışkan, 2012).

Validation: A significant portion of the process has garnered affirmative validation from the personnel spearheading the user research activities. A deeper analytical dive into counterfactual outcomes, precipitated from the employment of alternative tools (e.g., standard empathy maps vis-à-vis 5 senses empathy maps), is currently in progress, potentially unearthing further insights and refinements to this methodological apparatus.

OUTCOMES

The Observation phase at Palermo's "Orleans" subway station was a pivotal first step in our design methodology, encompassing 9 hours across different weekdays during peak times, and scrutinizing 1732 individuals. This initial data collection allowed for a detailed understanding of the station's

demographic, subsequently categorizing users into distinct groups based on characteristics and behaviors, providing a solid basis for future design phases.

- 1330 student,
- 273 Workers,
- 21 seniors,
- 30 travellers
- 1 disable
- 68 other (N.C.)

Observations at the subway station reveal a predominance of university students due to its proximity to the campus, highlighting the need for in-depth research into their specific needs and preferences to enhance the station's appeal. The use of the station by working professionals is also noted, while the scarcity of travelers and users with disabilities suggests potential architectural barriers, necessitating further investigation through both quantitative and qualitative methods, particularly targeted conversations with disabled individuals in the academic area.

The preliminary observations have become pivotal in guiding the subsequent stages of the project, particularly in planning and strategizing the interviews, enriching the understanding of user dynamics and instilling a nuanced, user-focused perspective for more informed and empathetic design decisions. The next phase, carefully conducted by the research team using the aforementioned semi-structured interview methodology, resulted in:

- 11 hours of interviews

Accumulating to:

- 53 interviews

Encompassing:

- 26 University Students
- 18 Workers
- 5 Teenagers
- 3 Elderly Individuals
- 2 Homemakers

The interviews corroborated the observational data on station usage, yielding valuable qualitative insights for generating “personas” reflecting users’ explicit and implicit fears and needs. This integration of semi-structured interviews and observational findings enriched our understanding of user dynamics, verifying the data and uncovering in-depth insights for a nuanced, empathetic approach to design evaluation and refinement. This demonstrates the research team’s commitment to a holistic, iterative, and user-centered methodology as the project progresses.

CONCLUSION

This document articulates a research journey utilizing a blended methodology grounded in Design Thinking and Urban Design principles to scrutinize user

behaviors and mobility choices in urban transit areas. Through a comprehensive integration of contextual analysis, on-site observations, and empathetic user interactions, a robust tapestry of insights was crafted, enhancing our qualitative understanding and setting the stage for future design phases. This iterative, user-centric approach, transitioning from initial proto-personas to detailed personas, ensures the inclusivity and responsiveness of the design to the dynamic urban environment. The case study at “Palazzo Reale Orleans” metro station in Palermo exemplifies the methodology’s potential impact across varied urban contexts, emphasizing the need for an empathetic, user-centric strategy to address the unique needs and challenges of different user demographics. Regarding the examination of user experience, this aspect will undergo development in the later stages of the collaborative efforts undertaken by the team at the National Centre for Sustainable Mobility (MOST), Spoke 9 Urban Mobility. The focal points of this endeavor will include the articulation of the monitoring framework as well as the establishment of engagement platforms

In conclusion, this paper presents a methodical, empathetic exploration of the complex challenges and opportunities within urban mobility ecosystems, positioning Urban Design and Strategic Design on a trajectory towards sustainable, inclusive urban mobility solutions and a richer academic and practical discourse in the field.

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