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Service co-design for the shared mobility sector

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Abstract

In this paper, we present an action-research process within an Horizon 2020 project conducted through a co-design approach with the SME Zehus. In order to define a new model of free-floating bike sharing service to be implemented in the city of Milan, co-design activities were conducted with different project stakeholders and structured in the form of an explorative workshop, creative sessions, and user tests. This approach allowed envisioning and validating solutions, sharing competencies, and make decisions through collaboration in a iterative process.

The adoption of co-design had relevant influence on the design of the final solution, going beyond the users' perspective, but rather focusing on those of the service provider and the municipality of Milan, which is going to host the service. The active involvement of Zehus in co-design activities also had an educational value, given by the transfer of service design competencies and tools, which can empower the company in approaching future businesses able to answer to the evolution of shared mobility.

KEYWORDS: service design, co-design, organizational changes, free floating bike sharing, shared mobility

Introduction

Among different methods that have been developed and applied over recent years in order to involve end users and other stakeholders in the design of new products, services, or public policies, co-design have been highly adopted as a way to generate innovation in a more efficient and inclusive manner (Dubois et al, 2016). It is, in fact, one of the most studied issues in design research (Brown, 2008) and it is possible to observe a big amount of literature dealing with co-design in terms of general definition and proliferation (Sanders, 2006). Co-design (Sanders and Stappers, 2008; Binder and Brandt, 2008) can have different connotations depending on the level of collaboration among the actors involved - who can vary from users, providers, employees, decision makers, design experts (Steen et al., 2011) - the scale of application - e.g. the company level or the wider urban level - and tools adopted. Moreover, co-design activities can be introduced at different steps of the design process:

- during the explorative research phase, in order to identify possible future scenarios and to deepen knowledge on users or the context at hand;
- during the ideation or development phase, in order to generate, prototype and test ideas with end users and stakeholders involved;
- and eventually during the evaluation phase of the service, in order to set up an evaluation strategy aimed at assessing values shared by the different actors of the service system (Foglieni et al., 2017).

Through co-design workshops and creative sessions, it is possible to imagine new ways of interaction, to design new products or service solutions as well as new business models, or to improve or validate existing ones (Steen et al., 2011).

The analysis of literature (Deserti and Rizzo, 2001; Dubois et al., 2016; Pirinen, 2016; Sander and Stappers, 2008; Reason et. al, 2016) highlights that co-designing with end users seems to increasingly diverge from co-designing with companies, especially in relation with tools adopted and the role of designers. According to Deserti and Rizzo (2011), one of the main difference among the two approaches lies in the goals pursued by the companies involved, which are usually focused on designing new business models and envisioning innovation as a dynamic and systemic change at each level of the organizations. Accordingly, co-designing with companies differs in the way the project is managed, since interactions occur among experts rather than final users. Co-design projects with companies, in fact, involve specialists and employees, with specific knowledge on the sector, the market, the company production processes as well as its mission and vision.

An additional aspect that differentiate co-design with a company from co-design with end users consists of the level of impact on the final solution and on the company itself. Over the past years, numerous design professionals operating in the field of service design had the opportunity to conduct projects able to stimulate and introduce changes within organizational systems. Accordingly, many researchers have been focusing on the topic and the transformative role of design has been largely investigated (Bate and Robert, 2007a, 2007b; Buchanan, 2004; Junginger, 2008; Junginger and Sangiorgi, 2009; Sangiorgi 2011; Somerville and Nino, 2007).

Literature about the topic shows that service design practitioners have been moving from providing solutions to specific problems, to providing organisations with the tools and capacities for human-centred service innovation (Junginger and Sangiorgi, 2009). According to Burns et al. (2006), there are 6 different key characteristics of service design's transformational power, that go, for example, from the formulation of the right problem and the definition of the brief, to applying participatory design techniques in order to bring together all stakeholders' ideas, expertise and knowledge, to finally creating fundamental change, as projects can initiate a lasting transformation process within a company. The transformational strength of service design constituted an important cause of reflection during the Bitride project, helping us to frame the results, even though we did not specifically direct our work towards transformational aims.

This paper focuses on a Horizon 2020 project where co-design activities with the company acquired a distinctive role.

The first part of the paper introduces the topic of shared mobility and it describes the project, called Bitride Bike Sharing, which aimed at defining a new bike sharing service model to be implemented by Zehus, a SME based in Milan. Then, the action-research methodology applied to the project is described.

The second part of the paper illustrates the co-design activities that have characterized the three phases of the project. Service design activities, in fact, were organized involving all the project stakeholders, and leveraging co-design as a facilitator of collaboration (Sanders and Stappers, 2008) between the project partners rather than with final users (Pirinen, 2016). This allowed researchers exploiting the knowledge and expertise of professionals involved, building up a collaborative setting in which they could come together and play an active role in all the phases of the process (Dubois et al., 2016). Accordingly, we present some of the first results emerging from the different phases, in particular focusing on the role of co-design in:

1. The design of the bike sharing service solution as a result of collective creativity based on the collaboration between design researchers, Zehus, project partners, and potential users selected from the stakeholders internal teams;
2. The educational value given by the transfer of design thinking competencies and tools to the company, fostering, on the one hand, collaboration within different departments of the company and facilitating, on the other hand, the shift of Zehus from being a manufacturing company to becoming a service provider.

To conclude, we formulate some considerations related to the main results of the Bitride project, describing how co-design impacted on the design of final solution and on the organizational changes related to the company's internal processes.

Bitride Bike Sharing: an action-research approach to design a free-floating bike sharing service

In recent years, fostering sustainable urban mobility has become one of the most important challenges for big cities (Cohen and Kietzmann, 2014). In the field of shared mobility, various innovative initiatives and best practices are emerging all around the world, tailoring and scaling services according to emerging user needs, behaviours, and preferences. Zehus Srl is an Italian SME operating in the field of human-electric propelled transport vehicles that addresses the B2B market, while its marketing division FlyKly Srl is in charge of the B2C sector. The company created the brand Bitride, which aims at creating a community of urban commuters, whose mobility experiences are improved by the use of hybrid vehicles. For this reason, the bike sharing project is conducted under the Bitride brand. Prior to the starting of the Bitride project, Zehus business model focused exclusively on developing and selling the patented hybrid technology to bikes and e-bikes manufacturers, but the dynamic nature of the company allowed the shift from a product-based to a service-based model. The intuition was to exploit the potential of the hybrid technology to introduce a new bike sharing model into the urban context.

To turn this intuition into reality, Zehus participated to the Horizon 2020 program of the European Commission, including service design competencies into the project and involving the Department of Design of Politecnico di Milano. Other project partners are Labor, a research and engineering laboratory, and AMAT, the Milanese Agency for Mobility, Environment and Territory, in charge of providing strategic planning and technical studies for urban mobility.

As experts in service design and design-driven innovation, the researchers of the Design Department of Politecnico di Milano collaborated with Zehus in order to design an innovative and effective bike sharing model that takes into considerations both business and users needs, and supported them in the design of the main touchpoint of the service, the Bitride App. Among the others, the role of design researchers revolved around the organization and management of co-design activities conducted during all the phases of the project.

The methodology adopted by design researchers can be described as an action-research (Stringer, 1999) in which researchers, Zehus managers and employees, and mobility experts of the Milan municipality were involved throughout the whole process, in order to frame research questions and validate them step-by-step through experiments, prototypes, and tests.

The action-research process was structured according to the traditional phases of the service design process (Meroni and Sangiorgi, 2011; Polaine et al., 2013; Stickdorn and Schneider, 2010; Foglieni et al., 2017; Moritz, 2005; Villari, 2014), including:

- The analysis and exploration of the shared mobility context, with a particular focus on the Milanese one (research phase);

- The interpretation of the research insights and the generation of ideas useful to define the final bike sharing service concept (concept generation phase);
- Design and implementation of the service solution and the Bitride App (service development phase).

As mentioned before, co-design played a crucial role in the project. Co-design activities have been structured in the form of collaborative creative sessions (such as workshops, meetings and user tests) aimed at generating and testing solutions, sharing ideas and taking decisions through collaboration.

Going into deep, they consisted of:

- During the research phase, some co-design sessions with Zehus and AMAT were organized in order to frame the research questions and better define the focus of the research. In addition, we conducted some interviews to external experts in the field of sustainable mobility;
- During the concept generation phase, a co-design workshop and several co-design sessions were used to actively involve all the stakeholders in the project. Workshop activities were designed ad-hoc for the project and documented with pictures and reports;
- During the service development phase, some co-design sessions and user tests were run with the aim of designing and testing the first mock-up of the Bitride App. User feedbacks were registered and integrated with pre- and post-session questionnaires.

To better support the process, a design researcher daily collaborated with Zehus, in order to structure and support all the activities on spot, informally talking with employees, directly observing their daily activities and procedures, and facilitating the information exchange with key actors.

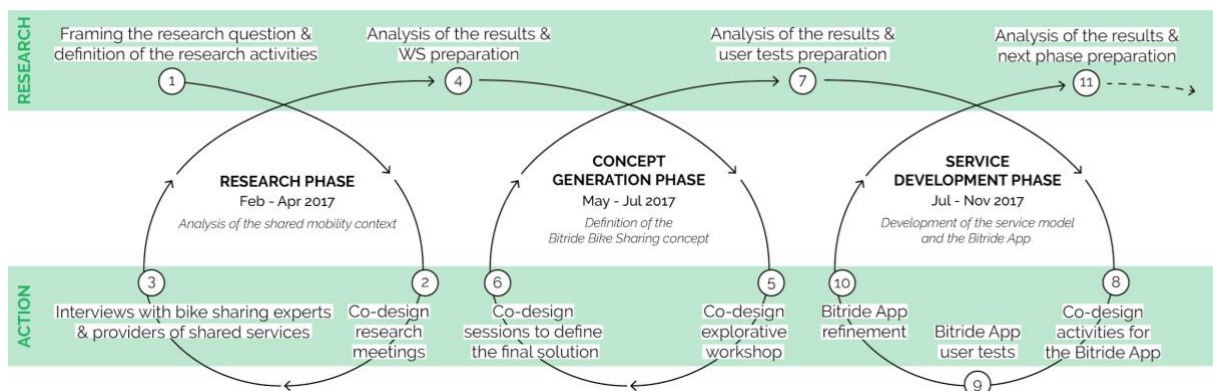


Figure 1 - The Bitride Bike Sharing action-research process

As follows, the first three steps of the action-research (Figure 1) are described, highlighting how the strong collaboration between design researchers and other project stakeholders brought to a co-designed solution and helped Zehus to start adopting the service design approach within the organization.

Research phase

The analysis of literature on shared mobility (Li and Voegelé, 2017; Ikeda et al., 2015) conducted during the first stage of the project, helped design researchers framing the context of operation and triggered a reflection on the innovation drivers that will characterize future mobility services.

The research phase was mainly qualitative, since the purpose was to understand people, contexts, and relationships, exploring behavioural patterns of users and, at a higher scale, market and society transformations. To frame the shared mobility context in which this project is embedded, we opted for a qualitative desk analysis on mobility trends

(Osservatorio nazionale sulla sharing mobility, 2016), academic papers on mobility services (Cohen and Kietzmann, 2014; Shaheen et al., 2010), informative articles, and best practices at the national and international level.

The collaborative design activities conducted during this phase mainly consisted of some co-design meetings with the project stakeholders, in particular with Zehus employees from different internal departments (such as the management team, sales specialists and engineers) and members of AMAT. Their purpose was to share specific knowledge and expertise regarding the shared mobility sector and its emerging trends, to better define the framework of the research in the wide current panorama, and to comprehend possible opportunities and barriers for the service implementation within the Milanese context. For this purpose, the design research team opted for an explorative map, where the different research areas of investigation were identified, clustered and finally selected in collaboration with Zehus and according to the company's interests and directions. This kind of approach was fundamental to benchmark existing solutions and understand the socio-economic drivers that will characterize the field of mobility in the next future. The benchmark analysis was also supported by interviews to some worldwide providers and experts of shared services in order to comprehend the peculiar elements of contemporary models, the most challenging and critical aspects, and the most diffuse user behaviours according to the different solutions. AMAT was involved in some of the co-design sessions with the aim of providing data about mobility and vehicles sharing services in Milan and to help in understanding the sudden evolution that the city was going through, due to the introduction of two new free-floating bike sharing services in September 2017. The contribution of AMAT was key in order direct the research towards some emerging issues, such as wild parking, vandalisms phenomenon, and the lack of regulation regarding these topics, both by the municipality and the service providers.

The results of this analysis allowed identifying a design guidance and potential target users, useful to address the following steps of the process.

Concept generation phase

The second step of the process aimed at transforming research insights and interpretations into ideas and it revolved around the organization of a co-design workshop, involving all the project stakeholders, regardless of their specific design knowledge, in an intense process of co-creation. The workshop itself has been fully co-designed, in its contents, purposes, adopted tools and structure in collaboration with Zehus, during some dedicated meetings. The workshop involved Zehus, AMAT, Labor, and few members of the Milan Municipality and ATM (Azienda Trasporti Milanesi), for a total of 17 participants (Figure 2 and 3). The purpose of this activity was to generate ideas and share opinions and competencies useful to the definition of the service concept. At this stage, the involvement of all the project actors was crucial to identify solutions that were coherent at various levels of the service system (i.e. back-office processes, customer experience, system of touchpoints).



Figure 2 - Workshop service co-design activities with the project stakeholders (1)



Figure 3 - Workshop service co-design activities with the project stakeholders (2)

To reach this objective and stimulate participation, the design research team, in agreement with Zehus, selected a list of topics on which to focus the discussion, based on the analysis of case studies previously analysed. Each topic was presented and addressed individually thanks to the use of some topics canvases and some facilitation cards reporting inspirational

questions, useful to foster the discussion and cover some of the most crucial aspects of the service. We also adopted some specific tools typically used in service design practice, elaborated on the insights emerging from the research phase, such as personas, describing behaviours and attitudes of target users, and storyboards, visualizing the service experience of these users while accessing and using the service (Figure 4).



Figure 4 - Workshop material: personas, storyboards, topics canvases and facilitation cards

The workshop lasted approximately 4 hours, during which the topics were deeply investigated and analysed by all participants, according to their specific expertise and experience regarding technical solutions, the shared mobility sector and the context of operation. Each group of partners was assigned with coloured post-its on which participants could report their comments and considerations. During the discussion, the design research team started clustering the comments according to their contents: some ideas suggested new possible solutions, while some comments were aiming at discarding or criticizing possible solutions.

Concepts emerging from each topic of discussion were later analyzed and clustered during a dedicated co-design meeting with Zehus management team, in order to identify key features to be embedded in the final solution and start defining the final bike sharing service concept to be further detailed in the next phase.

This allowed designing a first version of the Customer Journey Map of the overall free-floating bike sharing service, in order to visualize and detail the user experience, highlighting step-by-step all the options available to the user and the touchpoints (physical and digital) necessary to interact with the service.

The service development phase

The third phase of the project was dedicated to the service development, and focused in particular on the design of the Bitride App as the main touchpoint for accessing and using the service. The service development activity also included detailing the service solution, in terms of back-office and front-office processes, relations occurring among stakeholders

inside and outside the provider organization, resources, competencies, and technologies required to perform the service.

Also in this phase of the project, the adoption of a collaborative approach had relevant influence on the design of the final version of the App. Several co-design meetings (Figure 5) were organized by the design research team involving two UX and UI designers, the project manager, back-end and front-end developers, and software engineers from Zehus. In this case also, the purpose was to embed the specific knowledge of different experts in designing an effective and valuable solution. Starting from a draft version of the Customer Journey Map emerged during the co-design workshop, experts began defining the information architecture and the app wireframe, in agreement with the characteristics of the service concept previously detailed.

Thanks to this approach, it was possible to share step-by-step progresses with the project stakeholders, up to the fine tuning of the proposal.



Figure 5 - Co-design activities of the Bitride App involving service designers and UX/UI experts

Once the wireframe was developed, the App needed to be validated before being effectively implemented. For this reason, the design research team, in collaboration with the UX experts, set up two rounds of user testing (Figure 6). The tests focused on the service conceptual model on the one hand, and the app usability (in terms of navigation system, main features flow, button labelling, and error and feedback messages) on the other hand. The two rounds involved 10 potential service users, selected according to the clusters emerging from the research, among Zehus employees and design researchers of Polimi not directly involved in the Bitride project. Based on tests' results, UX experts and design researchers integrated users' feedback in a new version of the App wireframe, ready to be implemented.



Figure 6 - User test activities of the Bitride App

Main results of the co-design activities

Co-design activities conducted during the three phases of the Bitride project influenced in a strong way the design of the service solution and the company's internal processes.

During the research phase, one of the most relevant outcome achieved thanks to the co-design approach and the involvement of key stakeholders, was the definition of the research framework and the decision to focus on some emerging issues, generated by free-floating bike sharing services, that are currently concerning local authorities around the world: wild parking, vandalisms issues, and the impact of such services on the urban environment. The research activity, in fact, focused on the rapid growth of bike sharing services around the world, where cities' infrastructure and regulations were not prepared to handle such an overwhelming phenomenon. The constant exchange with the project partners, in particular with AMAT and the Municipality of Milan, drew attention towards the lack of regulations regarding these topics and the lack of control over where users park and how they use shared vehicles.

Accordingly, the adoption of a co-design approach favored the generation of service ideas that already embedded some critical thinking from the different perspectives of the service provider, the project stakeholders and the municipality of Milan. During the concept generation phase, and in particular during the co-design workshop, the core of the discussion revolved around how the provider could promote and encourage responsible behaviors and actions, informing users about the parking rules. The broad participation and the high engagement of the members of AMAT, the Milan Municipality and ATM, allowed the researchers to design a coherent and consistent service solution able to address this important topic. Two of the distinctive features of the Bitride Bike Sharing service are, in fact:

1. The multi-polar service area composed by several geo-fenced "virtual parking areas" where users are encouraged to park;

2. The adoption of a peer relocation approach that, thanks to a scoring system that rewards users for their active contribution to the service, is able to promote responsible and conscious behaviors.

During the service development phase, the user tests of the application represented another key moment for the co-design process. Also in this case, the iterative approach of prototyping, testing, and reviewing was experimented by Zehus for the first time. At first, this activity was not perceived by the company as strictly necessary for the overall purpose of the project, since it could have slowed down the development phase. However, the direct experience and involvement of Zehus employees during the activity, convinced the company of its value. The test, in fact, highlighted some critical aspects of the digital experience and some issues regarding the user interface, while, at the same time, it validated some of the most crucial aspects of the service conceptual model before being effectively implemented. Thus, the process helped reducing the risk of errors from both the user interface and back-end development perspectives. Thanks to the company's active involvement, prototyping the solutions at different stages of the design process was finally perceived as a strong value, not only for the Bitride project but as an internal approach from which employees will benefit in the future.

Discussion

Reflecting on the overall design process and the adoption of co-design within the context of shared mobility, lead us to formulate some considerations about the benefits of co-designing with companies.

Co-design with companies allows designers to play an extended role

During the project phases described above, design researchers played an extended role, from facilitators to triggers of innovation.

1. Facilitators of the design process (Senge, 1994; Tan, 2012), with the essential purpose of sharing common goals, building a common language among the various participants, bringing out their tacit knowledge, and promoting dialogue through the visualization of ideas and concepts (Segelström, 2013).
2. Enablers of a deep learning process for the company (Argyris, 1977; Senge, 1990). Zehus experienced co-design sessions for the first time, actively contributing in the service ideas generation on the one hand, and acquiring new design capabilities and tools to be embedded in order to tackle ideational processes, on the other.
3. Triggers of innovation (Deserti and Rizzo, 2011), since they were a source of inspiration for the company, experts able to bring in new visions, analyze the market trends, empathize with the stakeholders, describe future scenarios, boost innovation at the levels of strategic choices and business models.

Build trust relationships and a close collaboration for high valuable results

In the case of Bitride project, co-design played a crucial role as driver of change (Meroni and Sangiorgi, 2011): the collaborative approach facilitated the process of knowledge sharing among the project stakeholders, which were able to build a common language and to reach, guided by designers, a coherent and innovative service solution. We valued the importance to generate genuine interest among all the stakeholders, a strong commitment, and to build trust in the process (Junginger and Sangiorgi, 2009). Involving the project stakeholders since the first steps of the research phase, the constant exchange of information among all of them, the close collaboration with the company thanks to the full involvement of a service design researcher, and the organization of various iterative co-design sessions, proved to be the key to achieve the aforementioned goals, enabling a strong learning process for the company.

Co-design promotes user-centered approaches within the company

The overall benefits of co-design can be identified as improving the creative process and organization of the project, enabling creativity, awareness on the customer's perspective, internal cooperation on innovation, and better matching between offer and needs (Steen et al., 2011).

The active involvement during the research phase, for example, supported the company in better understanding the shared mobility context in which it aims to position and to identify its customer segment through an innovation-driven and user-centered analysis of the current panorama.

Moreover, thanks to the user tests and the numerous sharing sessions with the project stakeholders, the company reinforced its capability of connecting the needs of customers with those of the company, improving the quality of experiences, reducing the delivery gap of its services (Allen et al., 2005) and differentiating from competitors (Moritz, 2005).

Co-design helps to establish new innovation processes within the company

The co-design approach supported a shift in the internal innovation processes of the company towards new collaborative approaches, encouraging employees from different internal divisions to change perspective while working together. During the co-design sessions, they were supported in using creativity to analyze the material obtained from sharing sessions and turn them into meaningful directions for their work.

The co-design approach also implied a learning process for the company as a whole, given by the transfer of service design competencies and tools which can empower the organization in approaching future businesses that better answer to the evolution of the sharing economy. For example, the co-design workshop encouraged Zehus employees to think "out-of-the-box", especially in the situation where the deep knowledge and the familiarity with the technical solutions would have inhibited innovation. Besides, the company began adopting some service design tools, in particular Personas and the Customer Journey Map, and embedding them into daily activities. Since the Bitride project, in fact, these tools have been largely used also in other projects, such as the redesign of the Bitride App for the B2B market or the definition of the online user experience of customers buying the Flykly products.

Co-design helps shaping future steps of projects

The co-design activities also helped shaping the future phases of the Bitride project, such as the definition and implementation of the pilot project.

In light of the sudden transformations occurred within the Milanese bike sharing context, thanks to the involvement of AMAT which provided key data about mobility and vehicles sharing services in Milan, and due to the limited involvement of end users during previous project phases, Zehus opted for reorganizing the pilot project by splitting it into two different phases. Therefore, during a dedicated meeting with Zehus and AMAT, it was decided to set up a pre-pilot with a lower number of bikes, a selected number of users and within a delimited area of the city, in order to specifically validate the technology and the service model.

Moreover, the launch of the Bitride pre-pilot helped to formalize the new innovative approach acquired by the company. Since the first days of implementation, in fact, it played the fundamental role to open up the way to transformative changes (Junginger and Sangiorgi, 2009). It was perceived by Zehus as a seed for change, making the intangible tangible, providing the first valuable insights, actualizing the knowledge gained during the co-design sessions and generating new visions able to guide new organizational changes.

Co-design helps acquiring new competencies within the company

A side-effect of the co-design approach applied to the Bitride project, was the introduction of new competencies within the company, such as UX designers, two graphic designers, one product designer, a marketing and social media manager, one person in charge of the customer care service, and different external consultants. This demonstrates a shift on how Zehus perceives, engages, and incorporates design approaches and competencies, starting the real shift from being a manufacturing company to becoming a service one.

To sum up, the adoption of a service-oriented and user-centred approach required a deep change in the way the company used to develop its business and deal with innovation (Sangiorgi et al., 2016) and it can be analysed as an evolution on how Zehus will engage with end users and stakeholders in future projects.

Conclusions

Shared and sustainable mobility has become a trending topic in the last few years, raising interest from the public opinion and administrations around the world. The emergence of innovative initiatives tailored according to user expectations and behaviours towards mobility, clearly reveals the importance of fulfilling such needs. Based on our experience, and informed by the aforementioned literature, we think the case of Bitride Bike Sharing proved that a constant and close collaboration between service providers, public agencies, and experts working in the mobility sector constitutes a crucial approach for delivering innovative and coherent service solutions.

Similarly, the co-design approach with the company allowed us to reflect on the types of expected or unexpected transformational outcomes that such projects can generate within the organization, and the role that service designers can play in such processes.

In our opinion, a further exploration of the links between co-design activities with companies and the impact of organizational changes that occurs within them, could potentially constitute an interesting topic for further investigations.

To conclude, the case of Bitride discussed in this paper allowed us to highlight the importance of co-design occurring between service designers and a non-service company. Our opinion is that, in these cases, such an approach enables the emphasis on user needs as a driver to achieve business objectives, allowing creating value for both customers and the company. Business and technological requirements and constraints comes to dominate the development process only in a later stage, namely the effective implementation of the service.

In a competitive and constantly evolving sector, such as the shared mobility one, this approach can represent the key factor for distinction and successful replicability into other urban contexts.

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