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RISCIO'

Executive summary

Car sharing providers are trying to enable the concept of Mobility as a Service (MaaS) in Cities. However the business is not profitable. This is due in particular to the use of vehicles that are not designed for the sharing purpose. For this reason car sharing services do not completely satisfy users' requirements and generate excessive costs. Risciò project aims to produce a platform that can enable MaaS in a profitable way, connecting users, providers of the service and vehicles. Drivers of the solution are modularity, adaptability and essentiality of the platform. Inspiration was often searched outside the automotive field.

The ASP team developed a completely new User Interface that integrates smartphone and steering wheel, and designed a new Heating Ventilation and Air Conditioning (HVAC) system that provides users with personal thermal comfort but cuts energy consumptions. The innovative and sustainable business model exploits Risciò's competitive advantages focusing on small-medium sized locations. Renders, physical demonstrators and simulations were produced to prove the proposed concepts.

Key Words

Mobility as a Service (MaaS), Car sharing, Business Models, HVAC, User Interface.



Born to be shared



Project description written by the Principal Academic Tutor

In the Mobility as a Service context, and in particular regarding car sharing, Risciò Project aims to address the needs for a platform "born to be shared", flexible enough to be exploited in different kind of shared economy frameworks, and able to provide a complete service in a profitable way. According to this vision, the platform should not only consist in an urban mission dedicated vehicle, but needs to comprehend add-in devices, an app that permits configurations by the user and an IT system that manages the service. All the phases of the service are considered, starting when the user is off board, accompanying him/her during the driving phase until he/she stops the ride, and allowing for full connectivity during the whole process. With the aim to develop such a platform, the ASP Risciò Project focused on developing innovative technological and business solutions, specifically designed for a well-defined niche of customers and users. From the technological perspective, the team worked on the User Experience for an urban vehicle to be used in different kind of sharing economy scenarios such as carsharing or corporate fleets. Designed to be integrated with an innovative modular rolling chassis that supports patented battery pack and electric motors, previously developed by the project's technological and design partners, the main technologies developed by the ASP team regard the Heating Ventilation and Air Conditioning (HVAC) system and the vehicle User Interface. In particular, in the developing of the HVAC system the main focus has been to reduce the energy consumptions of the acclimatization system, that cause a range reduction of about 25% in standard electric cars, and even more in vehicles employed in car sharing, due to the short and frequent trips characterizing the service. Concerning the User Interface, the proposed solution aims to reduce the complexity of the user interactions along the whole service, integrating off and on board phases in a complete and safe experience. From the ergonomic perspective, the team focused on realizing a solution that fosters safety and intuition, defining "Eves On Road" and "Hands On Wheel" as driving principles. Moreover, the proposed UI can also reduce interiors related production costs, by optimizing the number of components involved, reduced to only four buttons and a wheel mounted screen. To prove the validity of what designed, the ASP team developed a thermodynamic analysis modelling the key features of the HVAC solution, the mock up of the User App and demonstrators of both the HVAC system and User Interface. Finally, from a business perspective, Risciò Project explored innovative solutions that can sustain small-scale application, in order to take advantage from the agility that characterizes growing startups and the relative availability of local investors. Moreover, a sound simulation of the revenue and cost model has been carried out to evaluate the impact of the Risciò platform adoption, bringing evidence of improvements in profitability of car sharing businesses, tackling mobility problems in both small and large cities.

Team description by
skillThe team is totally composed by engineering students, coming from the
Politecnico di Milano and Politecnico di Torino.Jacopo Berlusconi, Energy engineering, Polimi, Thermodynamics, Power

Jacopo Berlusconi, Energy engineering, Polimi, Thermodynamics, Power production and Management.

Marco Boretto, Mechanical engineering, Polito, FEM analysis, CAD Prototyping, Ergonomics developer.

Paolo Marini, Management engineering, Polimi, Business analysis, accounting, project management.

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Goal

Risciò project is aimed at developing an innovative platform, constituted by vehicles, softwares, and technologies, designed to suit and empower sustainable business models for Mobility as a Service (MaaS), adopting a B2B approach. The goals of the ASP team are the development of specific elements of the platform: the User Interface, the HVAC system and the business model, integrating them with the chassis and powertrain previously developed for Risciò by the project partners. The team aims to produce the conceptual design of UI, HVAC and business model, to translate the key features in physical demonstrators, and to perform simulations able to prove the effectiveness of proposed solutions. In the following are explained specific goals for the three parts. User Interface: design of a new UI, integrating different media of interaction, with the specific purpose to simplify and enhance the user experience within the service. HVAC: design of an innovative configuration able to ensure user comfort while minimizing energy consumptions, weight and cost. Business model: definition of contexts and strategies providing Risciò with competitive advantages and profit opportunities.



Understanding the problem

Modern cities are characterized by congestion and pollution, largely related to transportation issues. Many solutions worldwide were adopted to tackle these problems, spreading the MaaS paradigm. In particular, car sharing is a growing phenomenon well coupled with the present sharing economy trend. This market is dominated by big players as Oil and Gas companies, automotive enterprises and big battery manufacturers. However, the current business models are not profitable since the costs per vehicle and per user are too high. Players believe that growing numbers of vehicles can bring to an exponential increase of users that allow for higher user per vehicle ratio, utilization rates and consequently profits. A different approach is to reduce the cost per vehicle by changing the vehicle. According to Seat CEO Luca de Meo: "car sharing is not profitable since vehicles are not designed for the sharing purpose". In order to solve the pollution issue and also to be aligned to new automotive trends, modern urban shared vehicles must be electric. This is challenging because few cities have a dense distributed charging infrastructure and market shows that users are eager to free floating car sharing, in order not to be constrained to pre-defined parking spots. Users in today society are willing to reduce the inactive time while driving, being always connected to the external world and with a safe, ergonomic and enjoyable user experience (UX), which is not happening with current sharing solutions. From this analysis it is evident the request of the market for an integrated platform designed for the car sharing purpose, enabling connectivity, based on electric vehicles with an extended range.

Exploring the opportunities

While developing the envisioned platform able to achieve profitability and sustainability in its operation, the team explored many innovative ideas, frequently inspired by different fields of application. Both from technology and marketing perspective, Risciò team searched for successful patterns that could be applied to the proposed solution, and ended up with two main "mantras" to follow in each aspect of the project. The first mantra is "*Best is made of essentiality*", inspired by the successful strategy adopted by One Plus in the Mobile industry,

based on the distinction between real needs of the customer and features which are unnecessary. One Plus focused on high quality in all the important features of the product (offering a top performing smartphone at very low price), while saving money on extra activities (for instance advertisement and logistics, adopting an invitation-based purchasing mechanism). The second mantra, "*Put Exclusivity in place*", refers to the ability of a product of being perceived as exclusive because of the identity associated to it. The concept was taken by the successful story of Swatch in the watches market, who associated its brand to travels and personality by selling their customizable products in airports.

The technologies which were already available before the Team joined the project **Generating a solution** are the basic elements of Risciò's chassis and powertrain. These are a modular structurally safe chassis, with patented electric in-wheel motors and battery pack, suitable to sustain a light electric vehicle and to be assembled at contained cost even in small lots. The proposed business model focuses on car sharing services in small-medium cities and remote locations, leveraging on specifically designed features that provide Risciò platform with strong competitive advantages over competitors in those contexts. The solution elaborated by the Team focuses on how to build this competitive advantage, providing Risciò users with better experience, and Risciò customers with better profits than they would have with a traditional car sharing. Risciò platform is a solution "born to be shared", meaning that user-centered and customer-centered design are applied, focusing on the needs of car sharing providers and car sharing users, which are different from the needs of traditional mobility players. This leads to increase the autonomy of each vehicle, extending range and reducing O&M; to take into account that trips will be urban, short and frequent, with related impact on user's priorities and comfort perception; to consider that the business model will be sustainable if multiple locations are served, thus flexibility to suit the characteristics of different locations is needed. Considering this analysis, modularity is an enabler to align with essentiality and flexibility mantras.



Car sharing platform and interactions

The HVAC system is inherently modular due to a decentralized approach, based on the substitution of the standard central vapor compression cycle with a combination of components, each one dedicated to a specific function and a user. These components are sometimes chosen from automotive solutions (heated wheel, heated seats, electrically heated window coating) and sometimes borrowed from different application fields (smart glass, Peltier cells, PV panels). The latter group of components is integrated in an innovative element of the upper body, the Smart Roof, which works as follows: PV panels harvest energy from the sun, at the same time providing passive shadowing to the roof, the smart glass can be switched to opaque for active shadowing, and a Peltier cells layer can provide cooling or heating to the passengers below the roof, respectively releasing or absorbing heat from the external air layer between cells and PV. This configuration allows for flexibility and essentiality because the sizing of components can be customized by changing the number of installed modules.



HVAC solution in winter and summer condition

Essentiality is also a key driver for the User Interface (UI), which is characterized by the elimination of all elements that are not really needed by the user, determining ease of usage, safety and cost savings. To reduce the UI complexity, the whole User Experience of a car sharing user has been considered, from offboard phases to on-board driving, aiming to offer an integrated and complete solution. The proposed UI makes use of a smartphone app through with which the user can access the service and customize his experience by setting many options usually present on current cars dashboards, such as navigation and ambient temperature. Once on board, instead of employing different screens and controls dislocated in the vehicle, the solution presents few media of interaction, located close to the steering wheel and the driver's field of vision. Moreover, the intelligent smartphone positioning and a dynamic steering wheel interface allow the driver to stay connected with his device in a comfortable and safe way. Modularity and Flexibility are ensured since all the elements of the user interface are presented as add in, so they can be independently and easily changed according to each customer's requirements.



Proposed User Interface

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